HP ProLiant Storage System

iSCSI Feature Pack

User Guide

iSCSI Feature Pack User Guide

Contents

6   Replication

7   Backup

10 Command Line Interface

11 Troubleshooting

12 Glossary

Introduction

With an ever-expanding need for storage, it has become increasingly desirable for small and medium-sized businesses to consolidate and centralize all of their data.

While Windows-powered HP NAS products have addressed some of their file-level needs, consolidation/centralization of block-level storage for applications such as databases and messaging servers has been difficult for these businesses because of a lack of resources to address the costs and complexity of supporting a Storage Area Network. As a result, the majority of small and medium business databases and messaging servers are still using direct attached storage and storage administrators are facing increasing manageability problems.

The advent of a standard iSCSI protocol holds the promise of allowing these businesses to have their applications access centralized storage using their existing, familiar IP network infrastructure.

What is iSCSI?

You are probably already familiar with the Small Computer Systems Interface (SCSI) which enables host computers to perform block-level data I/O to a variety of peripheral devices (such as disk and tape devices and printers). The Internet SCSI (iSCSI) protocol adds dimension to SCSI and eliminates the distance limitation associated with it by enabling block-level I/O over the IP network.

With its ability to simply attach servers and storage devices into your existing network infrastructure, iSCSI enables your organization to cost-effectively build and manage a storage area network based on technologies (SCSI, IP) you already understand and use.

HP ProLiant Storage Server iSCSI Feature Pack

HP ProLiant Storage Server iSCSI Feature Pack for HP NAS products provides virtualization, allocation of disk storage, and centralized management for iSCSI host applications.

iSCSI Feature Pack is comprised of a Windows-compatible iSCSI target driver and an iSNS (Internet Storage Name Service) server. All software management has been integrated under a tabular "iSCSI" window in the Windows Server 2003 **Web Administration** screen.

The following figure illustrates how your NAS system provides file-level storage for your workstations, and how your iSCSI Feature Pack provides block-level storage for your application and file servers.

Workstations

Workstation Network

Microsoft Exchange Server
Microsoft SQL Server
Web Server
File Server
Print Server

Storage Network

HP ProLiant DL380 G4 Storage Server
HP ProLiant DL100 Storage Server
HP ProLiant ML110 Storage Server
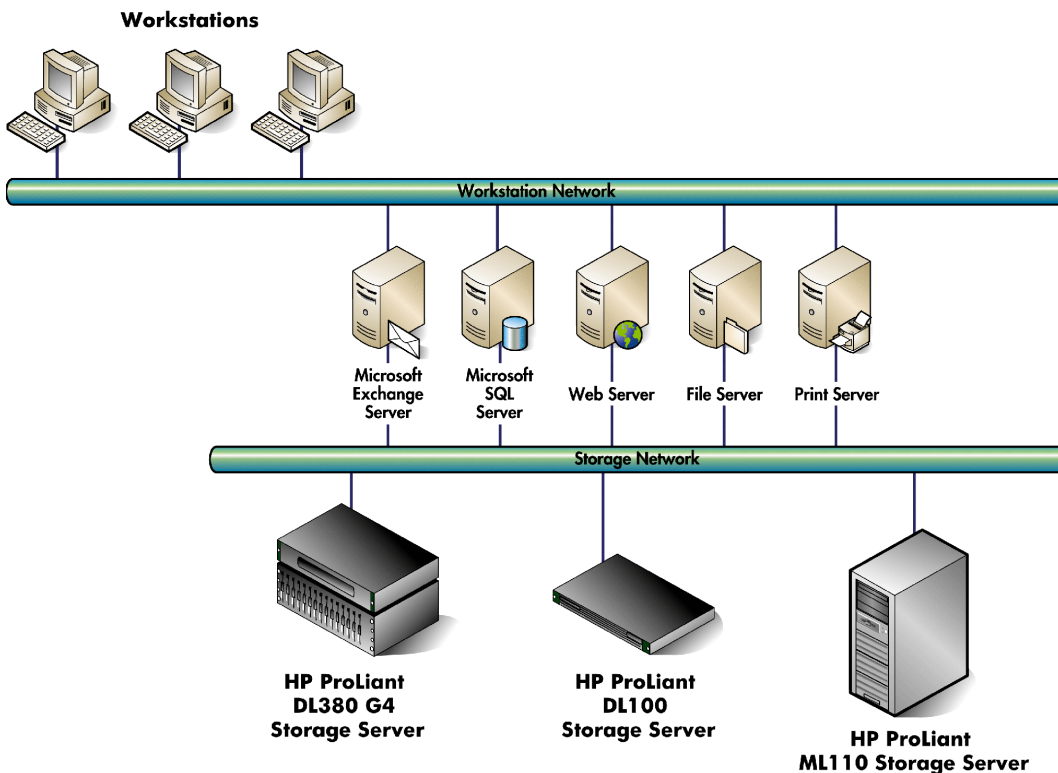
NOTE: Not all supported HP NAS storage servers are shown in this illustration.

iSCSI Feature Pack is supported on the following HP NAS platforms. For the Standalone Edition product:

- HP ProLiant ML110 Storage Server
- HP ProLiant ML110 G2 Storage Server*
- HP ProLiant DL100 Storage Server
- HP ProLiant ML350 G4 Storage Server
- HP ProLiant ML370 G4 Storage Server
- HP ProLiant DL380 G4 Storage Server (Base, External SCSI, and External SATA models)
- HP StorageWorks NAS 500s
- HP StorageWorks NAS 1500s
- HP StorageWorks NAS 2000s

*The ML110 G2 320GB model is not licensed to support iSCSI Feature Pack.

For the Gateway Edition product:

- HP ProLiant DL380 G4 Storage Server (SAN Storage model)
- HP ProLiant DL580 G2 Storage Server
- HP ProLiant DL585 Storage Server
- HP StorageWorks NAS 4000s
- HP StorageWorks NAS 9000s

Getting Started

The following steps provide an overview of the tasks you must complete to configure your system. An installation wizard will guide you through the software installation steps. Please note:

- If you are installing on an HP ProLiant DL380 G4 Storage Server, HP ProLiant DL100 100 Storage Server, or HP ProLiant ML110 Storage Server (G1 or G2), you can install the Standalone Edition of the product containing the iSCSI Feature Pack and the Application Storage Manager.
- If you are installing on an HP ProLiant DL380 G4 Storage Server (SAN Storage model), HP ProLiant DL580 Storage Server, or HP ProLiant DL585 Storage Server, you can install the Gateway Edition of the product containing the iSCSI Feature Pack.
- If you purchased licenses for the Backup or Snapshot features, you need to install agents for those options on the application servers. Refer to Snapshot Agents on page 71 for instructions.

To install the iSCSI Feature Pack software:

1. **For systems with a DVD/CD-ROM drive**:

   a. Insert the iSCSI Feature Pack installation CD into your CD-ROM.

   The installation CD should start automatically when you insert it. If not, run `setup.exe`.

2. **For systems without a DVD/CD-ROM drive**, you can either share the CD from another system, or copy the CD across the network.

   a. To share the CD from another system:

   - Insert the CD into another system and share out that system's DVD/CD-ROM drive.
   - From the NAS storage server, map a drive to the CD share and install from it. You can map to the DVD/CD share from your iSCSI storage server via Windows Terminal Services client,or via Remote Desktop if you do not have a monitor on your NAS storage server.

b. To copy the CD across the network:

- Create a directory on the C: drive of the NAS system (e.g. C:\iSCSI), and make it a share with Full Control (read/write permission).
- Connect to the share from a remote system that has a CD-ROM drive using the Microsoft File Explorer.
- From the remote system, copy the contents of the CD-ROM to the share on the NAS system.
- On the NAS system, use My Computer or the File Explorer to browse the directory that was created (e.g. C:\iSCSI). The contents of the iSCSI Feature Pack CD will now be in the directory. Click `setup.exe` to start the installation.

If your system does not have a monitor, you can use the Windows 2000 Terminal Services client or **Remote Desktop** (available from the **Maintenance** tab in the Web Administration console) to install the software.

NOTICE: The name of your iSCSI Feature Pack system cannot exceed 15 characters. This is a NetBIOS restriction. If your server name is longer, you must rename it before installing the iSCSI Feature Pack software.

NOTICE: You must use the ANSI machine name for the iSCSI Feature Pack system if you are running the system on a non-English language machine.

NOTE: Your system will be rebooted after the installation.

3. Start your Web Administration console (consult your HP NAS server documentation for instructions).

4. Click the **iSCSI** tab on the Web Administration console. All features related to the iSCSI Feature Pack can be found under this tab.

5. Click the **Configuration** tab or link.

6. Click the **License and Version Information** link.

7. On the License and Version Information window, click **Add**.

   The Add License window opens.

8. Enter the key code to activate the iSCSI Feature Pack, and then click **OK**.

9. Continue to enter key codes one at a time for any other features you purchased.

10. When you have activated all licenses, click **Back** on the License and Verification Information window to return to the Configuration window.

11. If you want to specify an Internet Storage Name Service (iSNS) server, click **iSNS Configuration**. For more information, refer to About the iSNS Server in this section.

12. The HP ProLiant ML110 Storage Servers and the HP ProLiant DL100 Storage Server have a single pre-allocated LUN and single file system. To allocate storage to the iSCSI target:

   a. Click **Storage** on the Configuration window. The iSCSI Storage window opens.

   b. Click **Create File Device**. The Create iSCSI File Storage window opens.

   c. Choose an available file-based device from the list.

   d. Specify the storage size in megabytes.

   e. Click **OK**.

   Refer to Creating a File-Based Device on page 17 for more information.

13. Install an iSCSI initiator on each of your host systems.

   iSCSI initiator software/hardware is available from many sources and needs to be installed and configured on all servers that will access shared storage.

   • For Windows hosts, you can download a software initiator from Microsoft's website: http://www.microsoft.com/windowsserversystem/storage/iscsi.mspx

   • For Linux hosts, you can download a software initiator from SourceForge.net: http://sourceforge.net/projects/unh-iscsi

   • For HP-UX, contact your local HP sales representative.

14. If you purchased a license for Snapshots or Backups, install the agents for those licenses on the application servers:

   a. Remove the installation CD from the NAS server.

   b. Insert the installation CD in the CD-ROM drive of the application server.

   Refer to Snapshot Agents on page 71 for agent-specific instructions. The program runs automatically and prompts you to enter a license for each agent that you choose to install.

15. Create your LUs. Refer to the Logical Units section for more details.
16. Add all of your hosts and assign them to your LUs. Refer to the Hosts section for more details. This document provides all of the information you need to get started with your iSCSI Feature Pack.

About the iSNS Server

iSNS facilitates device discovery in storage networks. For the iSCSI Feature Pack, iSNS facilitates the naming, registration, and discovery of iSCSI Logical Units (LU) by host initiators. By default, iSNS is disabled. If you have an external iSNS server, you can set the system to use it. If you do not have an external iSNS server, you can use the local one that is provided by the iSCSI Feature Pack (and runs as an independent Windows service when enabled).

HP Technical Support

Telephone numbers for worldwide technical support are listed on the following HP web site: http://www.hp.com/support. From this web site, select the country of origin. For example, the North American technical support number is 800-633-3600.

NOTE: For continuous quality improvement, calls may be recorded or monitored.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

HP Storage Web Site

The HP web site has the latest information on this product, as well as the latest drivers. Access the storage site at: http://www.hp.com/country/us/eng/prodserv/storage.html. From this web site, select the appropriate product or solution.

HP NAS Services Web Site

The HP NAS Services site allows you to choose from convenient HP Care Pack Services packages or implement a custom support solution delivered by HP ProLiant Storage Server specialists and/or our certified service partners. For more information see us at http://www.hp.com/hps/storage/ns_nas.html.

Configuring Your iSCSI System

When you select **Configuration** from the main iSCSI screen, the following functions are available:

- **iSNS Configuration** - Specify which iSNS Server to use.
- **Storage** - Manage iSCSI storage devices and pools.
- **Cluster** - View and configure the iSCSI Cluster Configuration. (This is an optional component. Refer to the *iSCSI Cluster* chapter for more information, if applicable.)
- **Default Portal Template** - Add/delete portals that will be assigned to hosts.
- **License and Version Information** - Enter key codes for licensed components.
- **Server Configuration Files**- Back up and restore the server configuration.
- **Server Credential** - Reset password for a remote iSCSI Feature Pack.
- **Server Diagnostic File** - Capture an X-ray for technical support.

iSNS Configuration

iSNS facilitates device discovery in storage networks. For the iSCSI Feature Pack, iSNS facilitates the naming, registration, and discovery of iSCSI Logical Units (LU) by host initiators.

By default, iSNS is disabled. If you have an external iSNS server, you can set the system to use it. If you do not have an external iSNS server, you can use the local one that is provided by the iSCSI Feature Pack. When enabled, it runs as an independent Windows service.

1. Select **Configuration** from the main iSCSI screen.
2. Select **iSNS Configuration**.
3. To use the local iSNS server, select **Use local iSNS** or to use an external iSNS server, select **Use remote iSNS at** and enter the server's IP address.

   NOTE: If you do not enable iSNS, you will need to register host initiators with your iSCSI Feature Pack. This enables the server to see the available initiators. Since this procedure can vary by vendor, you should refer to the documentation provided by the vendor.

Storage

Storage includes file devices as well as raw devices and storage pools:

- Raw devices can be used as is while pools can be created from raw device hardware RAID sets. Each storage pool can be a group of one or more physical devices. Any disk known to your Windows system that does not have valid partition information is a candidate for a storage pool.
- File-based devices can be created from files on a software volume.

Once created, LUs can be created from disks, pools, or file-based device and assigned to hosts.

When you select **Storage** from the **Configuration** screen, you will see a list of all of your existing iSCSI storage (except imported disks).

Creating a Storage Pool

1. Select **Configuration** from the main iSCSI screen.
2. Select **Storage**.
3. Click **New Pool**.
4. Enter a name for the pool.
5. Select one or more available devices to include in the pool.

Adding/Removing Devices From a Storage Pool

1. Click the checkbox to the left of the pool you want to modify.
2. Click **View Devices.**

   You will see a list of all iSCSI storage. Information about each device, including size, type, usage, and whether or not it is clustered is included here. You can click on the device name to see how the segments of the device are being used.
3. Select the devices that should be in this pool.

Merging Storage Pools

1. Click the checkbox(es) to the left of the pool(s) you want to merge.

   You can select to merge two or more pools.
2. Click **Merge Pools.**
3. Specify a name for the new pool.

Deleting a Storage Pool

> NOTE: You can only delete a pool if it is empty or if all of the devices in the pool have zero usage.

1. Click the checkbox(es) to the left of the pool(s) you want to delete.
2. Click **Delete Pool.**
3. Click **OK** to confirm the deletion.

Creating a File-Based Device

> NOTE: If you are using the iSCSI Cluster Service to protect your hosts from iSCSI Feature Pack failure, you should be aware that any file-based devices belonging to a failed iSCSI Feature Pack will not be available during the failover period. These file-based devices will become available again after failback occurs.

1. Click **Create File Device.**
2. Select the volume and specify how much space should be used from this volume.

Expanding a File-Based Device

If you did not use the entire volume to create your file-based device, you can expand it as more storage is needed.

To expand a file-based device:

1. Click the checkbox to the left of the file-based device.
2. Click **Expand File Device**.
3. Indicate how much space to add and click **OK**.

Deleting a File-Based Device

> NOTE: You can only disable a file-based device if it is not being used.

1. Click the checkbox to the left of the file-based device.
2. Click **Delete File Device.**
3. Click **OK** to confirm.

Viewing Device Layout

You can see how the segments of a device are being used, including whether it contains LUs, replicas, and/or snapshot area resources.

To view device layout for an iSCSI storage device that is not in a pool:

1. Click the checkbox to the left of the device you want to view.
2. Click **View Device Layout.**

To view device layout for a storage pool:

1. Click the checkbox to the left of the pool you want to view.
2. Click **View Devices.**
3. Click on the device name.

Adopting a Device

You can adopt a *foreign* iSCSI disk for the purposes of disaster recovery.

A foreign disk is a physical device containing iSCSI LUs previously set up on a different iSCSI system. You might need to adopt a disk if an iSCSI system is damaged and you want to import the server's disks to a new system.

1. Click **Adopt Device**.
2. Select the device you would like to import.

   You can click the **Rescan** link to refresh the list of available devices.

Cluster

(This is an optional component. Refer to the *iSCSI Cluster* chapter for more information, if applicable.)

Default Portal Template

Portals are access points used by hosts to communicate with the iSCSI Feature Pack. Each portal is a combination of an IP address, port number, and port group number.

By default, the iSCSI Feature Pack assigns each new host one portal for each network interface card (NIC) IP address used by the iSCSI Feature Pack, with the default iSCSI port number 3260 and group 0.

The Default Portal Template screen lets you set the template that will be used when new hosts are created. In other words, the portals listed on this screen will be offered to each new host. You may then want to customize the portals for a specific host so that, for example, each host uses a separate NIC or port.

> NOTE: In a clustered environment, make sure that the heartbeat IP address is not listed on the default portal list.

To add/remove portals:

1. Select **Configuration** from the main iSCSI screen.
2. Select **Default Portal Template**.
3. To add a new portal, click **Add**, select an IP address, and enter a port number and port group.

   To delete a portal, click the checkbox to the left of it and click **Remove**.

License and Version Information

To enter key codes for iSCSI Feature Pack components in order to activate the components:

1. Select **Configuration** from the main iSCSI screen.
2. Select **License and Version Information**.

   A list of all licensed components is displayed.
3. Click **Add**.
4. Enter the key code for the component.

Server Configuration Files

Your iSCSI Feature Pack provides a convenient way to protect your configuration, including host assignments, storage pools, and configuration of optional data availability services (such as snapshot, etc.). You should save the configuration any time you change it.

To **save the configuration** perform the following steps:

1. Select **Configuration** from the main iSCSI screen.
2. Select **Server Configuration Files**.
3. Click **Backup** to back up data to a local system.
4. Specify a location for the file.

You can restore your iSCSI Feature Pack configuration from a file that was created using **Backup**. Changes made since the configuration was last saved will not be included in the restored configuration. In addition, actual LUs that may have been deleted after the configuration was saved will not be re-created.

> NOTE: Restoring a configuration will overwrite existing configuration files and you will lose your current connection. The restoration function is for disaster recovery purposes and should not be used in the day-to-day operation of the server.

To **restore the configuration** perform the following steps:

1. Select **Configuration** from the main iSCSI screen.
2. Select **Server Configuration Files**.
3. Locate the saved file and click **Restore**.

    By default, the name of backed up file is: **iscsicfg.tgz**

    The iSCSI Feature Pack will be restarted once the restoration is complete.

    NOTE: For a clustered server, you must reboot the machine after restoration.

Server Credential

You can reset the internal password that the iSCSI Feature Pack uses to connect with a remote host (such as a replication target server or cluster server). This iSCSI Feature Pack password is not affected by changing the system password.

Resetting the credential is only necessary after a server is rebuilt or replaced. It is not effective if the name of the target replication server has been changed. In that case, you must re-enable (by disabling and then re-enabling) replication for all LUs that were configured to replicate to that target server.

To reset the password:

1. Select **Configuration** from the main iSCSI screen.
2. Select **Credential**.
3. Enter the name or IP address of the remote server and a valid username and password.

Server Diagnostic File

The iSCSI Feature Pack has a built-in diagnostic feature that captures information about your server into a file that can be sent to HP's technical support team.

To create a diagnostic file:

1. Select **Configuration** from the main iSCSI screen.
2. Select **Server Diagnostic File**.
3. Select **Create Diagnostic File**.
4. Specify a path for the file.

Logical Units

A Logical Unit (LU) is a logically mapped disk device that is created from a physical device or from a storage pool.

Hosts (file and application servers) do not have access to physical resources; they have access only to LUs. This means that physical resources must be defined as LUs first, and then assigned to hosts so they can access them.When a LU is assigned to a host, the host views the LU as its own attached storage device.

LUs offer the added capability of disk expansion. Additional storage blocks can be allocated from the LU's physical device or storage pool and appended to the end of the existing LU without erasing the data on the disk. Each LU may be expanded up to 2 TB.

When you select **Logical Units** from the main iSCSI screen, you will see a list of all existing LUs. Information about each LU, including which optional data services (such as replication, etc.) it is using, is included here. To search for a specific LU, type its name (or a few letters) and click **Go**. Only those LUs that match the letters you typed will be displayed.

From the **Logical Units** screen, the following functions are available:

- **New** - Create a new LU and assign it to a host.
- **Import** - Import a hard drive with existing data to take advantage of the iSCSI Feature Pack's storage services.
- **Delete** - Delete a LU.
- **View Layout** - See where a LU's components are located.
- **Expand** - Increase the size of a LU.
- **Hosts** - Change the host assignment or access rights for a LU.
- **Join Group** - Assign a LU to a group. (This function is only available if you have licensed Backup, Replication, and/or Snapshot.)
- **Leave Group** - Remove a LU from a group. (This function is only available if you have licensed Backup, Replication, and/or Snapshot.)
- **Properties** - View configuration of a LU or change the LU name.

In addition, if you have licensed Backup, Replication, and/or Snapshot, you can select the **Groups** link from the **Logical Units** screen. Groups allow you to link LUs together for snapshot synchronization purposes. Snapshots for all LUs in a group are taken at the same time whenever a snapshot is triggered.

From the **Groups** screen, the following functions are available:

- **New** - Create a new group and add hosts to it.
- **Delete** - Delete a group.
- **Logical Units** - View or change the assignments of LUs in a group.
- **Properties** - View configuration of a group or change the group options.

Creating a New Logical Unit

> NOTE: If you want a LU to include storage from multiple physical devices, you need to create a storage pool before creating the LU. Refer to the Configuring Your iSCSI System section for more details.

1. Select **Logical Units** from the main iSCSI screen.
2. Click **New**.
3. Enter a name for the new LU.
4. Select the location of the storage for the LU.

   The storage can be from a physical device or storage pool (composed of one or more physical devices) or, for systems with external storage, from raw devices available to the iSCSI Feature Pack.

   If you need to modify your RAID system to allocate additional space for your LU, click the link **Click here to add raid set**. Afterwards, click **Click here to force a rescan of the devices**.

5. Enter a **Size** for the LU.

   The minimum size for each LU is 20 MB.

6. Assign one or more hosts to the newly created LU and assign access rights for each.

- **No Access** - This host cannot access this LU.
- **Read Only** - This host will have read-only access to the LU.

NOTE: If you set Read Only access rights for a LU that contains an NTFS partition, that partition will only be readable in Windows 2003. The LU will not show up properly in Windows versions prior to 2003.

- **Read/Write Exclusive**- Only this host can access the LU. The host has both read and write access. All others (including Read Only) will be denied access.
- **Read/Write Non-Exclusive** - Two hosts can connect at the same time with both read and write access.

NOTICE: There is a potential for data corruption if you set the access rights to Read/Write Non-Exclusive and you have multiple hosts writing to a device at the same time.This option should only be used by clustered servers, because the cluster itself prevents multiple hosts from writing at the same time.

7. Confirm all information and click **Finish** to create the LU.

NOTE: In order for a host to use the newly created LU, you will have to take operating system-specific actions in order for the host to see the new storage. For example, with Windows you must rescan disks via the system's *Computer Management* (available through the *Control Panel*). You will then need to write a signature, create a partition, and format the drive so that the host can use it.

Importing a Logical Unit

(This feature is only available on systems with external storage.) The Import feature allows you to create a LU from an existing disk. Hard drives with existing data can be imported to make use of the iSCSI Feature Pack's storage services (such as snapshot, replication, etc.), without any migration/copying or modification of data.

This can be useful for protecting your existing local iSCSI virtual disks (used for file sharing) because it allows you to import each disk as a LU to take advantage of the iSCSI data services (such as replication).

Because imported disks are preserved intact, the devices are not virtualized and cannot be expanded. Imported disks are all maintained in a one-to-one mapping relationship (one physical disk equals one logical device). Unlike virtual devices, they cannot be combined or divided into multiple LUs.

In order to import a hard disk, it must be one of the following:

- Raw disk (no partitions)
- Non-boot, non-virtual disk with volumes that are not mounted and do not contain any iSCSI file devices

If you want to import a disk with existing data, you must unmount all volumes on the disk (i.e. unassign all drive letters) in order to make it available for import.

To import a disk:

1. On the **Logical Units** screen, click **Import**.
2. Enter a **Name** for the LU that is being created.
3. Select the disk to import.
4. Select the location where the disk information will be stored.

   NOTE: About 7 MB of disk space is needed to store information about the imported disk.

5. Click **OK**.

   You will see the imported disk listed with your other LUs. The **Type** will be listed as **Import**.

   NOTICE: Once a disk is imported, it should not be mounted by the local operating system.

Viewing Layout

You can see where a LU's components (including Snapshot area) are allocated (devices and sectors).

To view the layout:

1. On the **Logical Units** screen, click the checkbox to the left of the LU that you want to view.
2. Click **View Layout**.

Expanding a Logical Unit

Because virtualized LUs do not represent actual physical resources, they can be expanded as more storage is needed. The LU can be increased in size by adding more blocks of storage from unallocated space on the LU's physical device or storage pool.

Remember that you will still need to repartition the virtual devices and adjust/create/resize any file-systems on the partition after the virtual device is expanded. Because partition and file-system formats are specific to the operating system that the host is running, you must perform these tasks directly from the host. You can use tools like PartitionMagic® or Veritas Volume Manager™ to add more drives to expand existing volumes on the fly in real time (without application down time).

To expand a LU:

1. On the **Logical Units** screen, click the checkbox to the left of the LU that you want to expand.
2. Click **Expand**.
3. Indicate how much space to add and click **OK**.

   NOTE: If this LU is being replicated, the replica disk will automatically be expanded as well.

   NOTICE: In order for a host to access the newly expanded LU, you will have to rescan from your operating system's disk manager.

Assigning/Unassigning a Host to a Logical Unit

While you generally assign a host to a LU when you create the LU, at any time you can change the host assignment. To do this:

1. On the **Logical Units** screen, click the checkbox to the left of the LU whose assignment you want to change.
2. Click **Hosts**.
3. Assign one or more hosts to the LU and assign access rights for each.

   If you change the access rights for a host, you must go to your initiator software and re-login to the server in order for the change to take effect. If you are using the Microsoft iSCSI initiator, you need to launch the initiator software on the host machine and log off

(from the **Active Sessions** tab) and then log on (from the **Available Targets** tab). This will temporarily disconnect the host.

NOTE: In order for an existing host to access this newly assigned LU, you will have to take operating system-specific actions in order for the host to see the new storage. For example, with Windows you must rescan disks via the system's *Computer Management* (available through the *Control Panel*). You will then need to write a signature, create a partition, and format the drive so that the host can use it.

Adding a LU to a Group

NOTE: You can also assign LUs from the **Groups** screen.

While you generally assign LUs to a group when you create the group, at any time you can assign a LU to a group. To do this:

1. On the **Logical Units** screen, click the checkbox to the left of the LU you want to assign to a group.
2. Click **Join Group**.
3. Select the group.

Removing a LU from a Group

NOTE: You can also unassign LUs from the **Groups** screen.

To remove a LU:

1. On the **Logical Units** screen, click the checkbox to the left of the LU you want to remove from a group.
2. Click **Leave Group**.
3. Click **OK** to confirm.

Viewing Logical Unit Properties

You can view the configuration of a LU or change the LU's name. To do this:

1. On the **Logical Units** screen, click the checkbox to the left of the LU whose properties you want to view.
2. Click **Properties**.
3. If you want to change the LU's name, type a new name in the box and click **OK**.
4. If this LU has Snapshot enabled, click **Snapshot Area Storage** or **Snapshot Area Policy** to view/change information.

On the **Snapshot Area Storage** tab, you can change the size of your snapshot area.

On the **Snapshot Area Policy** tab, you can change your auto-expansion or snapshot notification policies.

5. Click **Advanced** to see information about the options enabled for this LU.

Deleting Logical Units

You can delete one or more LUs. All data on the LU will be deleted and the space occupied by the LU will become available for a new LU.

NOTE: You should not delete a LU if a host is attached to it.

To delete a LU:

1. On the **Logical Units** screen, click the checkbox(es) to the left of the LU(s) you want to delete.
2. Click **Delete.**
3. Click **OK** to confirm the deletion.

Creating Groups

NOTE: Groups are only available if you have licensed Backup, Replication, and/or Snapshot.

Groups allow you to link LUs together for snapshot synchronization purposes. This can be very useful for databases that use separate disks for different components of the database (such as logs and control files). With a group, snapshots for all LUs in a group are taken at the same time whenever a snapshot is triggered.

Groups can be configured for backup, replication, and snapshot. In order to add LUs to a group, the LUs must be must be configured the same way as the group. For example, if the group is configured for backup and snapshot, all of the LUs that will join that group must be enabled for backup and snapshot.

To create a group:

1. On the **Logical Units** screen, click the **Groups** link near the top of the screen.

   You will see a list of all existing groups. Information about each group, including which data options (such as backup, replication, or snapshot) it is configured for, and how many LUs belong to the group, is included here.

2. Click **New**.
3. Enter a name for the new group.

4. Select which data options should be configured for this group.

   If you select Replication, you will need to specify the server that will contain the replica and enter a valid username and password that will enable the system to connect to the target server. If the server that will contain the replica is part of a cluster, use the virtual IP address of teh cluster.

5. Specify if you want to use **Snapshot Notification**.

   This is for use with the optional snapshot agents offered by HP. When used, the system notifies the host to quiet activity on the disk before a snapshot is taken.

6. Select the LUs that should be assigned to this group.

   The system will only allow you to select eligible LUs.

7. Confirm all information and click **Finish** to create the group.

Assigning/Unassigning LUs to a Group

While you generally assign LUs to a group when you create the group, at any time you can change the LU assignment.

   NOTE: You can also assign/unassign an individual LU from the **Logical Units** screen.

1. On the **Groups** screen, click the checkbox to the left of the group whose assignment you want to change.

2. Click **Logical Units**.

3. Assign one or more LUs to the group.

Viewing Group Properties

You can view the configuration of a group or change the group options.

1. On the **Groups** screen, click the checkbox to the left of the group whose properties you want to view.

2. Click **Properties**.

3. If you want to change the group's name, type a new name in the box.

4. If you want to change data options, select the correct ones here.

5. If you want to change the use of snapshot notification, check/uncheck the box.

Deleting Groups

You can delete one or more groups.

NOTE: Deleting a replication group disables replication and deletes the group. Deleting a group does not delete the LUs assigned to the group.

To delete a group:

1. On the **Groups** screen, click the checkbox(es) to the left of the groups(s) you want to delete.
2. Click **Delete.**
3. Click **OK** to confirm the deletion.

Hosts

Hosts are the file and application servers that access Logical Units (LU). When a LU is assigned to a host, the host views the LU as its own attached storage device. Because LUs appear as locally attached devices, applications (such as file servers, databases, Web and e-mail servers) do not need to be modified to utilize the storage.

When you select **Hosts** from the main iSCSI screen, you will see a list of all existing hosts. To search for a specific host, type its name (or a few letters) and click **Go**. Only those hosts that match the letters you typed will be displayed.

From the **Hosts** screen, the following functions are available:

- **New** - Add a new host.
- **Delete** - Delete existing hosts.
- **Initiators** - Manage host initiators.
- **Logical Units** - Manage the LUs assigned to the host.
- **Portals** - Manage the IP portals that the host uses to communicate with the iSCSI Feature Pack.
- **Properties** - View configuration of a host or change authentication type.

Creating a New Host

When you create a new host, you select its authentication mode, define its initiators, and assign it LUs. By default, each new host is assigned one portal for each network interface card (NIC) IP address used by the iSCSI Feature Pack. Hosts use portals to communicate with the iSCSI Feature Pack. The portal that is initially assigned is determined by the **Default Portal Template**, which can be modified from the **Configuration** screen. After a host is added, you can change its portal via the **Portals** function, if necessary.

To create a new host:

1. Select **Hosts** from the main iSCSI screen.
2. Click **New**.

3. Enter a name for the host.

   You must use the ANSI machine name for the host machine if you are running the system on a non-English language machine.

   If the host will be running an HP Snapshot Agent, you must enter the actual, resolvable machine name for the host. If it is not running an HP Snapshot Agent, you can enter any name you would like.

4. Indicate how the host should connect to the server.

   What you select depends on where the host is located and how secure you require your connection to be. For most environments, the server IP address is sufficient and is the most secure. However, if the host is remotely located across a firewall and you do not have VPN access, you can use the *Server DNS Name,* assuming your iSCSI initiator/HBA supports this. Note that using a VPN with the server address is the more secure way to communicate across a WAN.

   NOTE: If you select *Server DNS Name*, the DNS name you enter must be accessible by the host.

5. Select the level of authentication between the Server and the Host Initiator(s):

   • **Anonymous** - No authentication.

   • **CHAP** - Hosts must authenticate using Challenge Handshake Authentication Protocol (CHAP). You will have to enter a username and secret that the host must know when connecting to the server.

   • **Mutual CHAP** - Requires both the server and host to authenticate using CHAP. You will have to enter a username and secret for both systems.

6. Select the iSCSI initiators that this host will use.

   Known iSCSI initiators are listed in the dropdown box. If you do not see your initiator, you can manually add it. You can also register your host initiators with your iSCSI Feature Pack so that they become known to the iSCSI Feature Pack. If you are using the Microsoft iSCSI initiator, run **Microsoft iSCSI Initiator** on the host machine.

   You can find the program in the Control Panel or on your desktop (if you are the user that installed it). Click **Add** on the **Target Portals** tab and enter the IP address or name (if resolvable) of the iSCSI Feature Pack. Use the default socket. If you get a message that it has been rejected after you click OK to add, ignore it.

Once the host attempts to communicate with the iSCSI Feature Pack, information will be stored about the host's initiators.

If you are using a different iSCSI initiator (not the Microsoft iSCSI Initiator), refer to the documentation that was provided by the vendor.

NOTE: A host can have multiple initiators, including network interface cards (NICs) and Host Bus Adapters (HBAs). Be sure to select all initiators from the same host machine.

7. Assign one or more LUs to the newly created host and assign access rights for each.

- **No Access** - This host cannot access this LU.
- **Read Only** - This host will have read-only access to the LU.

NOTE: If you set Read Only access rights for a LU that contains an NTFS partition, that partition will only be readable in Windows 2003. The LU will not show up properly in Windows versions prior to 2003.

- **Read/Write Exclusive** - Only one host can access this LU at a time. All others (including **Read Only**) will be denied access.
- **Read/Write Non-Exclusive** - Two hosts can connect at the same time with both read and write access.

NOTICE: There is a potential for data corruption if you set the access rights to Read/Write Non-Exclusive and you have multiple hosts writing to a device at the same time. This option should only be used by clustered servers, because the cluster itself prevents multiple hosts from writing at the same time.

NOTE: If you do not assign any LUs to this host, after the host is created, the **Status** field will display **Not Connected**.

8. Confirm all information and click **Finish** to create the host.

The **Status** field will display **Connected** if the host is assigned at least one LU.

NOTE: In order for a host to use the newly created LU, you will have to take operating system-specific actions in order for the host to see the new storage. For example, with Windows you must rescan disks via the system's *Computer Management* (available through the *Control Panel*). You will then need to write a signature, create a partition, and format the drive so that the host can use it.

Managing Host Initiators

The iSCSI Feature Pack can use an iSNS Server from any iSCSI Feature Pack to locate existing iSCSI initiators. However, each initiator can only be associated with a single host.

To add or delete initiators for a host:

1. On the **Host** screen, click the checkbox to the left of the host that you want to manage.
2. Click **Initiators**.

   A list of existing initiators for this host is displayed along with any iSCSI initiator alias.
3. To add a new initiator, click **Add.**

   You can then select from the automatically discovered initiators or you can manually enter initiators.
4. To delete an initiator, click the checkbox to the left of it and click **Remove**.

Managing the LUs Assigned to a Host

To change a host's LU assignments or access rights:

1. On the **Host** screen, click the checkbox to the left of the host whose assignment you want to change.
2. Click **Logical Units**.
3. Assign one or more available LUs to the host and assign access rights for each.

   NOTE: If you change the access rights for a host, you must go to your initiator software and re-login to the server in order for the change to take effect. If you are using the Microsoft iSCSI initiator, you need to launch the initiator software on the host machine and log off (from the Active Sessions tab) and then log on (from the Available Targets tab). This will temporarily disconnect the host.

Managing Portals

Portals are access points used by hosts to communicate with the iSCSI Feature Pack. Each portal is a combination of an IP address, port number, and port group number.

The iSCSI Feature Pack assigns each new host one portal for each NIC IP address used by the iSCSI Feature Pack. By default, the portal is a combination of the default iSCSI port number 3260 and group 0. This default can be changed through the **Default Portal Template** from the **Configuration** screen.

You may want to customize the portals for a specific host. For example, if you have four NICs, you may want to assign two for your messaging server and two for your database so that the communication traffic from one host does not overwhelm the other. Taking this example further, you can put the NICs for your messaging server in the same group or in two different groups. If they are in the same group, the host will communicate via both NICs, providing redundancy should one NIC fail. If the NICs are put into separate groups, there will be two independent paths with no redundancy.

You may also need to modify the port number that your portal uses. This would be necessary if the default port number (3260) is used by another application or if your firewall blocks the default port number.

> NOTE: In a clustered environment, make sure that the heartbeat IP address is not listed on the portal list.

> NOTE: You should take care to remove any non-active portals from the list of portals for the host. Otherwise, the host may encounter connection problems.

To add/delete portals for a host:

1. On the **Host** screen, click the checkbox to the left of the host that you want to manage.
2. Click **Portals**.

   A list of existing portals is displayed.

3. To add a new portal, click **Add,** select an IP address and enter a port number and port group.

   You cannot change a portal; You can remove and then add a portal.

4. To delete a portal, click the checkbox to the left of it and click **Remove**.

Viewing Host Properties

To view the configuration of a host or change the authentication type or host resolution:

1. On the **Host** screen, click the checkbox to the left of the LU whose properties you want to view.
2. Click **Properties**.
3. If you want to change the authentication type, select it and then enter the appropriate username(s) and secret(s).

   > NOTE: You cannot change the authentication type while the host is connected to a LU.

4. If you want to change how this host should connect to the server, select the resolution method.

Deleting Hosts

You can delete one or more hosts. Any LU assignment to this host will be lost (but the data on the LUs themselves remains intact). If you decide to re-create the host at a later time, you will have to re-assign LUs to it.

NOTE: You should not delete a host if it is attached to a LU.

To delete a host:

1. On the **Host** screen, click the checkbox(es) to the left of the host(s) you want to delete.
2. Click **Delete.**
3. Click **OK** to confirm the deletion.

Snapshots

A Snapshot is a point-in-time image of a Logical Unit (LU). Snapshots provide rapid recovery of data from *soft errors* such as virus attack or accidental file deletion.

The concept of performing a snapshot is similar to taking a picture. When we take a photograph, we are capturing a moment in time and transferring this moment in time to a photographic medium, even while changes are occurring to the object we focused our picture on. Similarly, a snapshot of an entire disk allows us to capture data at any given moment in time and move it to either tape or another storage medium, while allowing data to be written to the disk.

Each new snapshot initially uses no disk space. As new data is written to the source volume, the old data blocks are moved to a temporary snapshot storage area. By combining the snapshot storage with the source volume, the data can be re-created exactly as it appeared at the time the snapshot was taken.

Snapshots protect where high-availability configurations cannot, because in creating a redundant set of data, high-availability configurations also create a duplicate set of soft errors by default. Snapshots protect data from accidental file deletions and from the malicious intent of viruses.

By tracking multiple virtual images of the same disk marked by "time," if you need to retrieve a deleted file or "undo" data corruption, you can re-create/restore the disk instantly based on any of the existing Snapshots.

Snapshots also provide an "undo button" for data processing. Traditionally, when an administrator performed operations on a data set, a full backup was required before each "dangerous" step, as a safety net. If the step resulted in undesirable effects, the administrator needed to restore the data set and start the process all over again. With Snapshots, you can easily rollback (restore) a drive to its original state.

When you select **Snapshots** from the main iSCSI screen, you will see a list of all existing groups and LUs along with information about existing Snapshots. To search for a specific group or LU, type its name (or a few letters) and click **Go**. Only those LUs that match the letters you typed will be displayed.

From the **Snapshots** screen, the following functions are available:

- **Enable** - Create a storage area for snapshots.
- **Disable** - Disable snapshots for a LU or group and delete existing snapshots.
- **View Snapshots** - View existing snapshots. From here you can create, copy, mount, or rollback a snapshot.
- **View Group** - View members of this group and perform functions for individual LUs. (This function is only available if you have licensed Backup, Replication, and/or Snapshot.)
- **Schedule** - Determine how often snapshots should be taken.
- **Properties** - View/change snapshot properties.

Enabling Snapshots

Enabling Snapshots creates a storage area that is used to hold data for snapshots. It does not actually take a snapshot of the LU.

1. Select **Snapshots** from the main iSCSI screen.
2. Click the checkbox to the left of the group or LU that you want to enable.

    NOTE: If you select a group, all LUs in the group must be enabled for snapshot. If they are not, select **View Group** first and enable each one. Then, enable the group for snapshot.

3. Click **Enable**.
4. Select where the snapshot data will reside.
5. Select the amount of space to initially allocate for snapshots.

    Each snapshot initially uses no disk space. As new data is written to the source volume, the old data blocks are moved to the temporary snapshot storage area. Therefore, it is not necessary to have 100 percent of the size of the LU reserved. The typical amount is around 20 percent to 30 percent, however, this depends on the amount of activity (number of new writes) to the disk. You can set the snapshot storage area to expand automatically, as needed.

6. Determine whether your snapshot storage area should be automatically expanded if it approaches its capacity and how it should be expanded.

    If you want to automatically expand the storage area when space is running low, check **Auto-Expand Snapshot Area Resource**.

    The **Threshold** is used to determine if more space for the snapshot area is needed. Determine how full the snapshot area must be (as a percentage of the snapshot area) before expansion will begin.

The **Increment** is used to determine the amount of space to be allocated for each expansion. You set this as a percentage of the size of the snapshot area. There is no limit to the number of times the snapshot area can be expanded.

In **Maximum Size**, either select **Unlimited** or enter the maximum size allowed for the snapshot area. Remember that if your snapshot area reaches the maximum, the system will delete the oldest snapshots to free up more room. Because the storage area may also be used to hold data for the replication and backup options, you should be sure to allow enough space for your system.

7. Specify if you want to use **Snapshot Notification**.

This is for use with the optional snapshot agents offered by HP. When Snapshot Notification is used with a snapshot agent, the system notifies the host to quiet activity on the disk before a snapshot is taken.

8. Confirm all information and click **Finish** to enable Snapshot.

You will know that the storage area has been created because you will see **AS** in the **Options** field for the LU, **Snap Size** and **Snap Avail** will both display the initial size of the snapshot storage, and the status is now **Enabled**.

Scheduling the Creation of Snapshots

You can determine how often Snapshots will be created.

1. On the **Snapshots** screen, click the checkbox to the left of the LU for which you want to schedule snapshots.

2. Click **Schedule**.

   You will see a listing of all existing schedules for this LU.

3. To create a schedule, click **New**.

4. Enter the frequency for snapshots to be created in the **Schedule Task** field.

   • **Once** - Select the date and time for this one-time snapshot.

   • **Hourly** - Select the date and time for the first snapshot and indicate the frequency (in hours).

   • **Daily** - Select the date and time for the first snapshot and indicate the frequency (in days).

   • **Weekly** - Select the time for the first snapshot, indicate the frequency (in weeks), and specify on which days the snapshot should be taken.

   • **Monthly** - Select the time for the first snapshot. Indicate the day the snapshot should be taken (either type in the exact date or select a relative - first, last - day of each month). Also, specify on which months the snapshot should be taken.

   NOTE: You should not schedule multiple jobs (snapshot creation and replication) to all start at exactly the same time. If you have more than five scheduled jobs, you should space the start times out by a minute or more.

5. Click **OK** to create the schedule.

   You are returned to the schedule screen where you will see your new schedule listed. From this screen, you can delete the schedule, disable or re-enable the schedule, or view (and change) the schedule properties.

Viewing Existing Snapshots

You can display a list of existing snapshots for a LU. From this screen you can create, copy, mount, or rollback a snapshot. To view existing snapshots:

1. On the **Snapshots** screen, click the checkbox to the left of the LU you want to view.
2. Click **View Snapshots**.

   You will see a listing of all existing snapshots for this LU. You can now create a new snapshot or delete an existing snapshot. To copy, mount, or rollback a snapshot, refer to the proper sections below.

Creating a New Snapshot

1. On the **Snapshots** screen, click the checkbox to the left of the LU that you want to snapshot.
2. Click **View Snapshots**.
3. Click **New**.
4. If desired, type a description of the snapshot in the **Comment** text box.
5. Click **OK** to take the snapshot.

Copying a Snapshot

Copying a snapshot creates a new, independent LU that is a point-in-time image of the snapshot. This is useful for creating multiple sets of current data for independent use (such as testing, data analysis, data mining, etc.) without downtime or impact to production servers. The new LU has all of the properties of a regular LU and can be assigned to a host for processing and configured for any storage services.

1. After you select **View Snapshots** for a LU, click the checkbox to the left of the snapshot you want to copy.
2. Click **Copy**.
3. Enter a name for the new LU.
4. Select where to get the storage for the new LU.
5. Click **OK** to create the copy.

Mounting/Dismounting a Snapshot

Mounting a snapshot allows you to mount a snapshot as a LU. Use **Mount** if you need to restore individual files from a drive but you do not want to rollback the entire drive to a previous point in time. Simply use **Mount** to mount the snapshot and then copy the files you need back to your original LU.

Mount also enables you to perform "what if" scenarios, such as testing a new payroll application on your actual, but not live, data. After mounting the snapshot, the drive can be assigned to an application server for independent processing without affecting the original data set. A mounted snapshot cannot be configured for any storage service (such as replication).

Why should you use **Mount** instead of **Copy**? Unlike **Copy**, which creates a new LU and requires disk space equal to the original disk, **Mount** does not require any disk space to mount. It is also quicker to mount a snapshot than to copy data to a new LU.

1. After you select **View Snapshots** for a LU, click the checkbox to the left of the snapshot you want to mount.
2. Click **Mount**.
3. Enter a name for the mounted snapshot.
4. Click **OK** to create the mounted snapshot.

When you are finished with your mounted snapshot, you can dismount it. Dismounting removes the mounted snapshot from the LU list. To dismount:

1. After you select **View Snapshots** for a LU, click the checkbox to the left of the snapshot you want to dismount.
2. Click **Dismount**.
3. Click **OK** to dismount the snapshot.

Rolling back a Snapshot

Rollback restores your LU to a specific point-in-time, based on your existing snapshot. After rollback, your drive will look exactly like it did when the snapshot was created.

> NOTE: **Rollback** is not reversible. Once you roll back, you cannot roll forward. If you need to restore just a few files from a drive, use **Mount** instead.

1. Detach the host(s) from its LU before rollback.
2. After you select **View Snapshots** for a LU, click the checkbox to the left of the snapshot you want to rollback.
3. Click **Rollback**.
4. Click **OK**.

> NOTE: If the snapshot is on a VSS-aware volume, refer to Mounting or Rolling Back a Snapshot on a VSS Volume for steps on unlocking this LU for read/write access.

Deleting a Snapshot

> NOTE: You cannot delete a snapshot if it is mounted. You must go to the **Logical Units** screen and delete the mounted LU first.

1. After you select **View Snapshots** for a LU, click the checkbox(es) to the left of the snapshot(s) you want to delete.
2. Click **Delete**.
3. Click **OK**.

Viewing Group Information

You can view members of this group and perform functions for individual LUs. To do this:

1. On the **Snapshots** screen, click the checkbox to the left of the group whose properties you want to view.
2. Click **View Group**.

    The tasks you can perform for the individual LUs are the same as those you would perform from the **Snapshots** screen. Refer to the appropriate section for more information about each task.

> NOTE: You cannot take a snapshot of an individual LU if the group is configured for snapshot.

Viewing/Changing Snapshot Area Properties

You can view or change the snapshot policies for a given LU. To do this:

1. On the **Snapshots** screen, click the checkbox to the left of the LU whose properties you want to view.
2. Click **Properties**.

   On the **Snapshot Area Storage** tab, you can change the size of your snapshot area.

   On the **Snapshot Area Policy** tab, you can change your auto-expansion or snapshot notification policies.

Disabling Snapshot

NOTICE: Disabling Snapshot deletes all existing snapshots.

To do this:

1. On the **Snapshots** screen, click the checkbox(es) to the left of the LU(s) you want to disable.
2. Click **Disable.**
3. Click **OK** to confirm.

Creating Snapshots on a Microsoft® VSS-aware Volume

If your iSCSI host is running on Windows® Server 2003 and you perform host-based backups using VSS-aware third-party backup software, you must install the HP VSS Hardware Provider on your host machine.

The VSS Hardware Provider can be installed on your host machine from the iSCSI Feature Pack installation CD.

NOTE: If you have installed the HP Snapshot Agent for Microsoft VSS, you do not need to install the VSS Hardware Provider separately because it is automatically installed with the snapshot agent.

Replication

Replication improves business continuity and protects against disasters by replicating selected iSCSI Logical Units (LUs) to a remote HP ProLiant Storage Server with the iSCSI Feature Pack.

At prescribed intervals, a snapshot is taken of the resource (known as the *primary disk*) and the changed data is transmitted to the replica disk on the *target server* so that they are synchronized. The replica disk is usually located at a remote location. Under normal operation, hosts do not have access to the replica disk.

If a disaster occurs and the replica is needed, you can promote the replica to become the primary LU and put it into production so that hosts can access it.
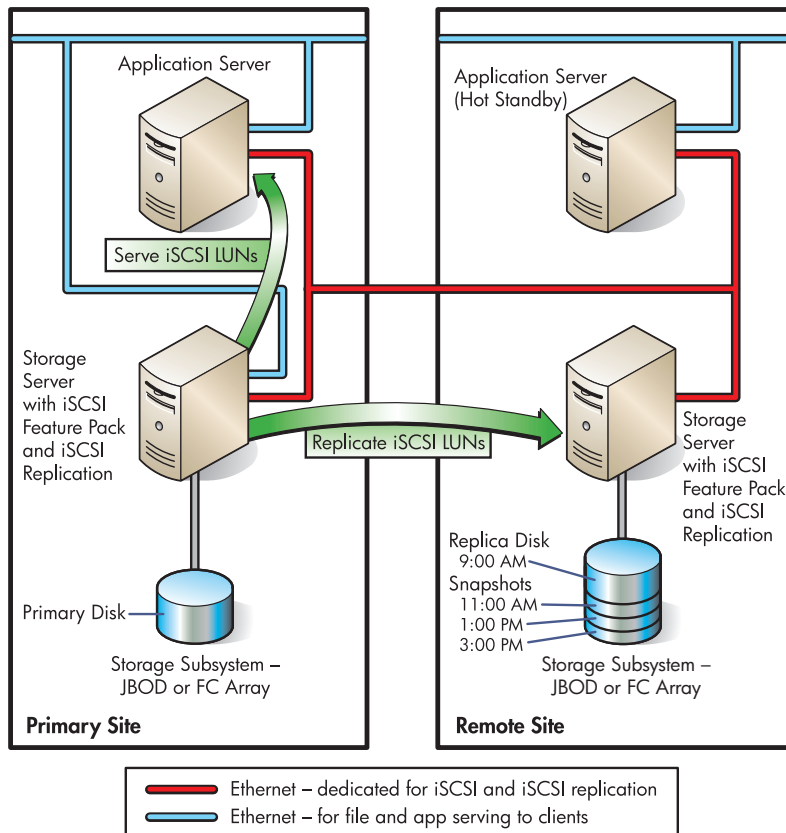
When you select **Replication** from the main iSCSI screen, you will see a list of all existing groups and LUs along with information about existing replications. To search for a specific group or LU, type its name (or a few letters) and click **Go**. Only those LUs that match the letters you typed will be displayed.

From the **Replication** screen, the following functions are available:

- **Enable** - Enable replication for a LU or group.
- **Disable** - Disable replication for a LU or group.
- **Start** - Manually start data replication.
- **Stop** - Stop a replication that is currently in progress.
- **Promote** - Promote a replica disk to become a primary LU.
- **Rollback** - Restore a replica disk to its last good state.
- **View Group** - View members of this group and perform functions for individual LUs. (This function is only available if you have licensed Backup, Replication, and/or Snapshot.)
- **Schedule** - Determine how often replication should take place.
- **Properties** - View/change replication configuration.

Enabling Replication

Enabling Replication creates a storage area on the source LU. It does not actually start replication.

1. Select **Replication** from the main iSCSI screen.
2. Click the checkbox to the left of the LU that you want to enable.

   Each LU can only have one replica disk

3. Click **Enable**.
4. If there is no snapshot area on the source LU, select the location of the storage for the snapshots and select the amount of space to initially allocate for snapshots.

   Each snapshot initially uses no disk space. As new data is written to the source volume, the old data blocks are moved to the temporary snapshot storage area. Therefore, it is not necessary to have 100 percent of the size of the LU reserved. The typical amount is around 20 percent to 30 percent, however, this depends on the amount of activity (number of new writes) to the disk. You can set the snapshot storage area to expand automatically, as needed.

5. Determine whether your snapshot storage area should be automatically expanded if it runs low and how it should be expanded.

   If you want to automatically expand the storage area when space is running low, check **Auto-Expand Snapshot Area**.

   The **Threshold** is used to determine if more space for the snapshot area is needed. Determine how full the snapshot area must be (as a percentage of the snapshot area) before expansion will begin.

   The **Increment** is used to determine the amount of space to be allocated for each expansion. You set this as a percentage of the size of the snapshot area. There is no limit to the number of times the snapshot area can be expanded.

   In **Maximum Size**, either select **Unlimited** or enter the maximum size allowed for the snapshot area. Remember that if your snapshot area reaches the maximum, the system will delete the oldest snapshots to free up more room. Because the storage area may also be used to hold data for the snapshot and backup options, you should be sure to allow enough space for your system.

6. Specify if you want to use **Snapshot Notification**.

   This is for use with the optional snapshot agents offered by HP. When used, the system notifies the host to quiet activity on the disk before a snapshot is taken.

7. Specify the server that will contain the replica by entering the target server's name or IP address.

   If the server that will contain the replica is part of a cluster, use the virtual IP address of the cluster.

8. Enter a valid username and password that will enable the system to connect to the target server.

9. Select where the replica disk should come from.

   You can create a new LU for the replica disk or use an existing one.

10. Select where the storage area on the target should come from and the amount of space to initially allocate.

    The storage area on the target is used to hold the last successful replication. Should a problem occur during replication (such as a transmission problem), the replica is rolled back to the last successful replication.

11. Determine whether the storage area should be automatically expanded if it runs low and how it should be expanded.

Because old data blocks are moved to the storage area as new data is written to the replica, the storage area should be large enough to handle the amount of changed data that will be replicated. Because it is not always possible to know how much changed data will be replicated, it is a good idea for you to enable expansion on the target server's storage area.

12. Specify if you want to use **Snapshot Notification.**

13. Confirm all information and click **Finish** to enable Replication.

You will know that replication has been enabled because you will see **R** in the **Options** field for the LU. The status will initially be **Scanning** and then changes to **New**. Scanning prepares the disk for the first replication.

NOTE: For added protection, or to access data on a replica without promoting it, you can connect to the target server and enable Snapshot or Backup for a replica resource.

NOTICE: You should not change the hostname of the source or target replication server after replication is enabled. If you do, all LUs that were configured for replication to the target server must be re-configured by first disabling replication and then enabling it. In addition, if you change the name of the source replication server, it will leave *orphan* replicas on all of its target servers. These orphan replicas will need to be manually removed (deleted, promoted, etc.). Refer to Changing the Hostname of a Source or Target Server for more information.

Starting Replication

Starting replication causes the LU to begin replicating to the replica disk.

1. Click the checkbox to the left of the LU that you want to replicate.

2. Click **Start**.

3. Click **OK** to start replicating.

You can see the progress of your replication in the **Status** field (you will need to refresh). Afterwards, the **Status** field returns to **Idle.**

Stopping Replication

You can only use this feature when replication is actually taking place.

1. Click the checkbox to the left of the LU that you want to stop.
2. Click **Stop**.
3. Click **OK** to stop the replication.

    The **Status** field shows **Replication Error**.

Scheduling Replication

You can determine how often replication will take place.

1. Click the checkbox to the left of the LU for which you want to schedule replication.
2. Click **Schedule**.

    You will see a listing of all existing schedules for this LU.

3. To create a schedule, click **New**.
4. Enter the frequency for replication in the **Schedule Task** field.

    •   **Once** - Select the date and time for this one-time replication.
    •   **Hourly** - Select the date and time for the first replication and indicate the frequency (in hours).
    •   **Daily** - Select the date and time for the first replication and indicate the frequency (in days).
    •   **Weekly** - Select the time for the first replication, indicate the frequency (in weeks), and specify on which days the replication should take place.
    •   **Monthly** - Select the time for the first replication. Indicate the day the replication should take place (either type in the exact date or select a relative - first, last - date of each month). Also, specify on which months the replication should occur.

    NOTE: You should not schedule multiple jobs (replication and snapshot creation) to all start at exactly the same time. If you have more than five scheduled jobs, you should space the start times out by a minute or more.

5. Click **OK** to create the schedule.

    You are returned to the Replication Schedule screen where you will see your new schedule listed. From this screen, you can delete the schedule, disable or re-enable the schedule, or view (and change) the schedule properties.

Promoting the Replica Disk

Promoting converts a replica disk into a primary LU.

Because the replica disk is used for disaster recovery purposes, hosts do not have access to the replica. If a disaster occurs and the replica is needed, you can promote the replica to become the primary LU so that hosts can access it. Doing this breaks the replication configuration.

You must have a valid replica disk in order to promote it. For example, if a problem occurred (such as a transmission problem or the replica disk failing) during the first and only replication, the replicated data would be compromised and therefore could not be promoted to a primary LU. If a problem occurred during a subsequent replication, and your primary disk is not functional, you will need to roll back the replica disk before promoting it. Rolling back restores the replica disk to its last good state (after the last successful replication).

> NOTE: You cannot promote a replica disk while a replication is in progress.

1. Click the checkbox to the left of the LU that you want to promote.
2. Click **Promote**.
3. Enter a name for the promoted replica.

   The **Status** field will now show **Disabled**.
4. Connect to the remote server and assign hosts to the promoted LU.

Rolling Back the Replica Disk

You will need to roll back your replica if the primary disk is not functioning and the last replication was not successful. Rolling back restores the replica disk to its last good state (after the last successful replication).

> NOTE: You must be on the target server in order to rollback.

1. Click the checkbox to the left of the replica LU that you want to roll back.
2. Click **Rollback**.
3. Click **OK** to confirm.

Re-creating Your Original Replication Configuration

Your original (local) primary disk became unusable due to a disaster and you have promoted the replica (remote) disk to a primary LU so that it can service your hosts. You have now fixed, rebuilt, or replaced your original primary disk. Do the following to re-create your original replication configuration:

1. Connect to the *remote* server and **Enable** replication to the disk that you just fixed, rebuilt, or replaced.
2. Click **Start** to replicate data to the fixed/rebuilt/replaced disk.
3. After replication completes, connect to the local or replica server and **Promote** the fixed/rebuilt/replaced disk.

   This breaks the replication configuration.
4. Assign hosts to the fixed/rebuilt/replaced disk.
5. **Enable** replication from the fixed/rebuilt/replaced disk to the replica disk.

Viewing Group Information

You can view members of this group and perform functions for individual LUs. To do this:

1. On the **Replication** screen, click the checkbox to the left of the group whose properties you want to view.
2. Click **View Group**.

   The tasks you can perform for the individual LUs are the same as those you would perform from the **Replication** screen. However, you cannot disable or promote individual LUs in the group. They must first be removed from the group.

Viewing Replication Properties

You can view your replication configuration for a given LU. To do this:

1. Click the checkbox to the left of the LU whose properties you want to view.
2. Click **Properties**.

Disabling Replication

Disabling Replication cancels all future replication and deletes the replica LU. To do this:

1. Click the checkbox(es) to the left of the LU(s) you want to disable.
2. Click **Disable.**
3. Click **OK** to confirm.

   The **Status** field will now show **Disabled**.

Changing the Hostname of a Source or Target Server

We do not recommend changing the host name of the source or target replication server once replication is enabled. Doing so will result in replication failure and will require that all LUs configured for replication to the target server be re-configured (by disabling and then re-enabling replication). If, for some reason, the host name has been changed, refer to the following steps to reconfigure replication.

> NOTE: You should not rename a server with a name that is only different in case (ServerA vs. Servera) after replication has been configured. This will cause the replica machine to be unusable as a replica target.

1. If the replica source and target servers have different administrator passwords, use the **Reset Credentials** option on the source server.
2. Promote the replica from the source server.

   The replica now becomes an LU on the target server.
3. Re-enable replication for the previously replicated LU on the source server and specify the promoted LU on the target server.

Backup

Backup allows you to perform a backup/restore of your iSCSI drives without impacting the performance of your applications.

Using Backup with your own backup software eliminates the need for the application server to play any role in backup and restore operations. Hosts benefit from performance increases and the elimination of overhead associated with backup/restore operations because the command and data paths are rendered exclusively local to the iSCSI Feature Pack. This results in the most optimal data transfer between the disks and the tape, and is the only way to achieve net transfer rates that are limited only by the disk's or tape's engine. The backup process automatically leverages the iSCSI Feature Pack's snapshot technology to guarantee point-in-time consistency.
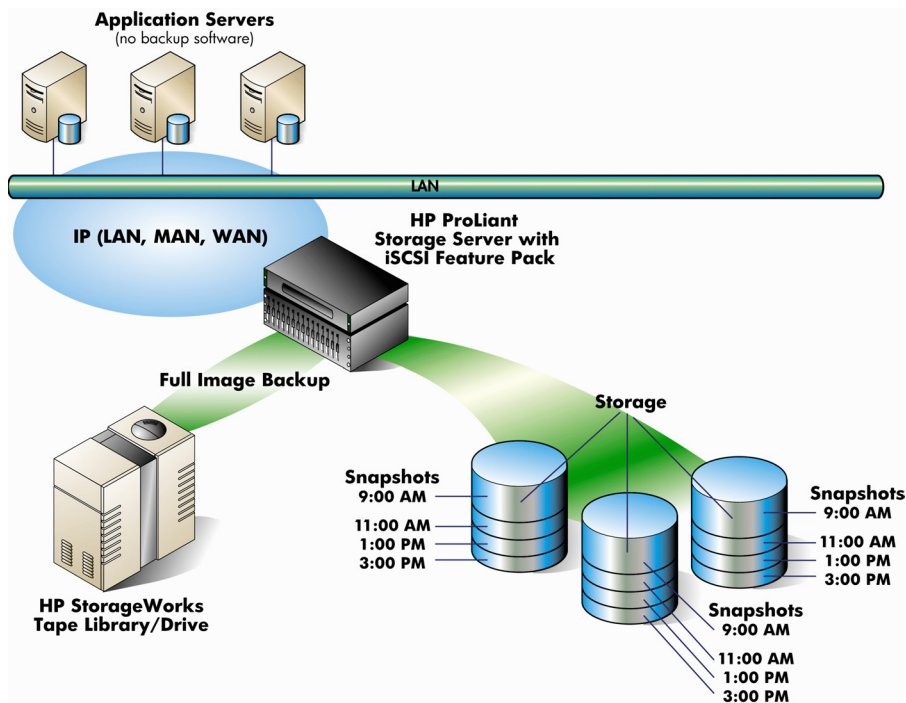
NOTE: You can also expose an iSCSI LUN to another server (such as a backup server). However, if Microsoft VSS (Volume Shadow Copy Service) agents are used, the application server mounting the snapshot must be running an Enterprise version of Windows Storage Sever 2003 to be able to mount a VSS snapshot that was created on another machine.

When you select **Backup** from the main iSCSI screen, you will see a list of all existing groups and LUs along with information about existing backups. To search for a specific group or LU, type its name (or a few letters) and click **Go**. Only those LUs that match the letters you typed will be displayed.

From the **Backup** screen, the following functions are available:

- **Enable** - Create a storage area for backups.
- **Disable** - Disable backups for a LU.
- **Backup** - Create and mount snapshots for backup or dismount and delete existing snapshots.
- **Restore** - Mount a LU so that it can be restored.
- **View Group** - View members of this group and perform functions for individual LUs. (This function is only available if you have licensed Backup, Replication, and/or Snapshot.)
- **Properties** - View/change backup configuration.
- **Settings** - Set mount point for backup and restore.

Enabling Backup

Enabling Backup creates a storage area that is used to hold mounted snapshots.

1. Select **Backup** from the main iSCSI screen.
2. Click the checkbox to the left of the group or LU that you want to enable.

   NOTE: If you select a group, all LUs in the group must be enabled for backup. If they are not, select **View Group** first and enable each one. Then, enable the group for backup.

3. Click **Enable**.
4. Select the location of the storage for the snapshots.
5. Select the amount of space to initially allocate for snapshots.

   Each snapshot initially uses no disk space. As new data is written to the source volume, the old data blocks are moved to the temporary snapshot storage area.

6. Determine whether your snapshot storage area should be automatically expanded if it runs low and how it should be expanded.

   If you want to automatically expand the storage area when space is running low, check **Auto-Expand Snapshot Area**.

   The **Threshold** is used to determine if more space for the snapshot area is needed. Determine how full the snapshot area must be (as a percentage of the snapshot area) before expansion will begin.

   The **Increment** is used to determine the amount of space to be allocated for each expansion. You set this as a percentage of the size of the snapshot area. There is no limit to the number of times the snapshot area can be expanded.

   In **Maximum Size**, either select **Unlimited** or enter the maximum size allowed for the snapshot area. Remember that if your snapshot area reaches the maximum, the system will delete the oldest snapshots to free up more room. Because the storage area may also be used to hold data for the Snapshot and Replication options, you should be sure to allow enough space for your system.

7. Specify if you want to use **Snapshot Notification**.

   This is for use with the optional snapshot agents offered by HP. When used, the system notifies the host to quiet activity on the disk before a snapshot is taken.

8. Confirm all information and click **Finish** to enable Backup.

   You will know that Backup is enabled because you will see **AB** in the **Options** field for the LU and the status is now **Enabled**.

Mounting and Dismounting Snapshots for Backup

To make the files associated with a LU or group available for backup, a snapshot of that LU or group must be taken and mounted. This makes a complete point-in-time image of the data available to the backup application via the mount point.

NOTE: If a LU is used by the storage server as a local drive (as indicated by an **N** in the **Options** column), you cannot mount a snapshot of it. Instead, use your backup application to back up the local drive directly.

If shadow copies are enabled for this volume and the drive contains database files, start the Hardware Provider for Microsoft VSS before performing the backup. Be sure to stop this service after you complete the backup, as leaving it running can cause problems when you back up LUs for other hosts.

If you're using the Snapshot Service, you can schedule snapshots to occur on a regular basis, and then mount any of these snapshots for backup.

After the backup application has finished backing up the data, you can dismount the snapshot. (Only one snapshot of each LU or group can be mounted at the same time, so you must dismount the currently mounted snapshot before you can mount a different snapshot.)

You can take a new snapshot, mount an existing snapshot, and dismount a snapshot using two mechanisms:

- The Web UI
- Backup scripts

With the Web UI, you can select a specific snapshot to mount. With backup scripts, you always mount the latest available snapshot, but you can run the backup scripts programmatically from your backup application, streamlining the overall backup process.

Mounting and Dismounting Snapshots Using the Web UI

Mounting a Snapshot for Backup

To mount a snapshot for backup:

1. On the **iSCSI** screen, click the **Backup** tab.
2. Select the LU or group that you want to back up.

   Backup must be enabled for the selected LU or group (that is, the **Status** column must display **Enabled**).
3. Click **Backup**.

   The **Prepare for Backup** screen lists all existing snapshots for the selected LU or group, identified by the date and time when the snapshot was taken.
4. If no snapshots currently exist, or if you want to create a new snapshot, click **New**, type a description of the snapshot in the **Comment** text box if desired, and click **OK**.

   The new snapshot appears on the **Prepare for Backup** screen. (It might take a few minutes to create the snapshot.)
5. Select the snapshot that you want to mount.
6. Click **Mount**.
7. In the **Backup Name** text box, type a unique name for the mounted snapshot, and then click **OK**.

   On the **Prepare for Backup** screen, the backup name appears in the **Mounted As** column for the selected LU or group, and **Mounted for Backup** appears in the **Status** column. In addition, a subfolder that includes the backup name is created within the

mount point folder, and all the folders and files within the LU or group appear within that subfolder.

At this point, your backup application can back up the mounted snapshot from the specified location.

Dismounting a Snapshot

When the backup application has finished backing up the mounted snapshot, dismount it:

1. If you're not currently viewing the **Prepare for Backup** screen, click the **Backup** tab, select the LU or group whose snapshot you want to dismount, and then click **Backup**.

   If you're not sure which LUs have mounted snapshots, click the **Logical Units** tab. The **Name** column displays the backup name followed by the name of the associated LU or group in parentheses.

2. Select the currently mounted snapshot (**Mounted for Backup** appears in the **Status** column).

3. Click **Dismount**.

4. Click **OK** to confirm the dismount.

   The **Prepare for Backup** screen indicates that no snapshot is currently mounted for this LU or group.

Mounting and Dismounting Snapshots Using Scripts

Using backup scripts allows you to leverage the storage server's command line interface to create and mount a new snapshot, mount the latest snapshot, or dismount the latest snapshot for a particular LU or group. This provides a quick, easy way to perform these tasks without using the Web UI. In addition, if your backup application supports pre- and post-backup scripts, that application can run these scripts programmatically.

The Backup Enabler comes with two pre-backup scripts and one post-backup script:

- **Prebackup_create.bat**—Creates and mounts a new snapshot
- **Prebackup_mount.bat**—Mounts the latest snapshot
- **Postbackup_dismount.bat**—Dismounts the last snapshot

If haven't already created a snapshot of the LU or group that you want to back up, or if you want to create a new one before performing the backup, use prebackup_create.bat as your pre-backup script.

If you have an existing recent snapshot (for example, if you're using the Snapshot Service and snapshots are regularly scheduled), you can use prebackup_mount.bat as your pre-backup script. (This can speed backup performance since there's no need to wait while a new snapshot it taken.)

Use postbackup_dismount.bat as your post-backup script.

These scripts are located in the folder where you installed the storage server.

Before You Begin

Before you run the backup scripts, the following prerequisites must be met:

- Backup must be enabled for the specified LU or group.

- Make sure that the MIcrosoft Windows Server 2003 automount feature is disabled. You can disable this feature using Mountvol or Diskpart. To disable it with Diskpart, use the following command:

  ```
  Diskpart automount disable
  ```

- If the Cluster Service is enabled, you must modify all of the scripts to include the server cluster virtual IP address, user name, and password. Using any text editor, open the scripts and change the following:

  ```
  iscsicli
  ```

  to the following:

```
iscsicli /server:VIP /user:username /pw:password
```

where *VIP* is the virtual IP address of the server cluster, and *username* and *password* are the user name and password to use to access that cluster.

Running the Backup Scripts

To run the backup scripts, use the following syntax:

script_name mount_point LU_name backup_name

where each variable has the following value:

Variable	Value
script_name	The name of the script
	The installed location of the scripts is in the system path, so you do not have to include the path to the file. However, if you move the scripts to a location that is not in the system path, include the full path to the file. In addition, if the path to the file includes spaces, enclose the full name in quotation marks (for example, `"C:\My Scripts\prebackup_create"`).
mount_point	The NTFS drive and directory where the snapshot should be mounted
	If the path contains spaces, enclose the full name in quotation marks (for example, `"C:\My Backups"`).
LU_name	The name of the LU or group
	The specified LU or group must use the NTFS format.
backup_name	The unique name to use for the mounted snapshot
	This name is used as part of the subfolder name within the mount point folder.

For example, to create and mount a new snapshot of LU1 on C:\Backups using the name Backup1, you would use the following command:

```
prebackup_create C:\Backups LU1 Backup1
```

To dismount that snapshot after the backup is complete, you would use the following command:

```
postbackup_dismount C:\Backups LU1 Backup1
```

CAUTION: If any snapshots were mounted in addition to the one mounted by the pre-backup script, you must dismount them *before* running the post-backup script. Otherwise, delayed write errors will occur, and the storage server might become corrupted, requiring a reboot.

Running the Backup Scripts Using Your Backup Application

The procedure for running the backup scripts using your backup application varies with each package. For example, to run prebackup_create.bat using VERITAS Backup Exec v9, you would use the following command:

```
cmd /c "prebackup_create C:\Backups LU1 Backup1"
```

For information about running these scripts with your particular backup application, refer to the documentation for that application.

Deleting a Backup

> NOTE: You should remove the drive letter associated with the backup before deleting it. Otherwise, you may see a message that the system is trying to close an active device. If this happens, select **Ignore** to continue.

1. Click the checkbox to the left of the LU that had been backed up.
2. Click **Backup**.

   You will see a listing of all existing backups for this LU.

3. Click the checkbox to the left of the backup that you want to delete.
4. Click **Delete**.
5. Click **OK** to confirm.

Restoring a LU

You must mount a backup snapshot in order to restore it.

> NOTE: You must disconnect hosts from this LU before restoring it.

1. On the **Backup** screen, click the checkbox to the left of the group or LU you want to restore.
2. Click **Restore**.
3. Click **Mount**.
4. Click OK to assign the LU locally.
5. Use your backup software to restore the LU.
6. Click **Dismount** to dismount the LU.

Viewing Group Information

You can view members of this group and perform functions for individual LUs. To do this:

1. On the **Backup** screen, click the checkbox to the left of the group whose properties you want to view.
2. Click **View Group**.

   The tasks you can perform for the individual LUs are the same as those you would perform from the **Backup** screen. Refer to the appropriate section for more information about each task.

Viewing/Changing Backup Properties

You can view or change the backup policies for a given LU. To do this:

1. On the **Backup** screen, click the checkbox to the left of the LU whose properties you want to view.

2. Click **Properties**.

   - The **General** tab displays information about the backup policies.

   - On the **Snapshot Area Storage** tab, you can change the size of your Snapshot Area.

   - On the **Snapshot Area Policy** tab, you can change your auto-expansion or snapshot notification policies.

Disabling Backup

Backup can only be disabled if all created backups for the specific LU are deleted. To disable backup:

1. Click the checkbox to the left of the LU you want to disable.

2. Click **Disable.**

3. Click **OK** to confirm.

Settings

You can specify where LUs should be locally mounted for backup and restore. The specified volume must be an NTFS volume directory. Once this option is enabled, NTFS-formatted LUs will be mounted as subdirectories under the specified directory when they are mounted for backup or restore.

An example of a valid mount point would be: c:\company_backups

All backups and restores will be saved to subdirectories beneath this directory. The subdirectories are named in the following way:

Type	Format	Example
For individual LUs	\backup name_partition #	\Fridaybackup_p1
For groups	\backup name_LU name_partition #	\Fridaybackup_LU2_p1

Because there can be multiple directories for each backup/restore, if you have a backup/restore script, you would point it to the following in our example to ensure that all directories are included: c:\company_backups\Fridaybackup*

> NOTE: If you do not set this option, each backup/restore will create an unmapped disk. You will then have to use your local disk management tool to assign a drive letter to the unmapped disk so that your backup application can access it.

To set global backup options:

1. On the **Backup** screen, click **Settings**.
2. Check **Mount logical units to an NTFS volume directory**.
3. Enter the mount point (for example, c:\company_backups).

iSCSI Cluster

iSCSI clustering increases application server availability by eliminating the downtime that can occur if an iSCSI Feature Pack fails. Working in conjunction with Microsoft® Cluster Services, continuous access to data by hosts is maintained even if one iSCSI Feature Pack fails. When the failure of a cluster group resource occurs, the other iSCSI Feature Pack assumes the identity of the failed server and automatically begins servicing its hosts. This process is called *Failover*.

Failback occurs when the primary server has been restored to health and the secondary server releases the identity of the primary to allow the primary to restore its operation. Depending upon how you have configured Microsoft Cluster Services, this may occur automatically or manually. Once control has returned to the primary server, the secondary server returns to its normal monitoring mode.

Types of Clustering

There are two types of clustering that you can configure:

- *Active-Passive Cluster* - Only one iSCSI Feature Pack (the primary server) is monitored by a secondary iSCSI Feature Pack. In the event the primary fails, the secondary assumes its identity and resources.

- *Active-Active Cluster* - Two iSCSI Feature Packs monitor each other. In the event either server fails, the other takes over and serves the failed server's hosts, in addition to its own hosts.
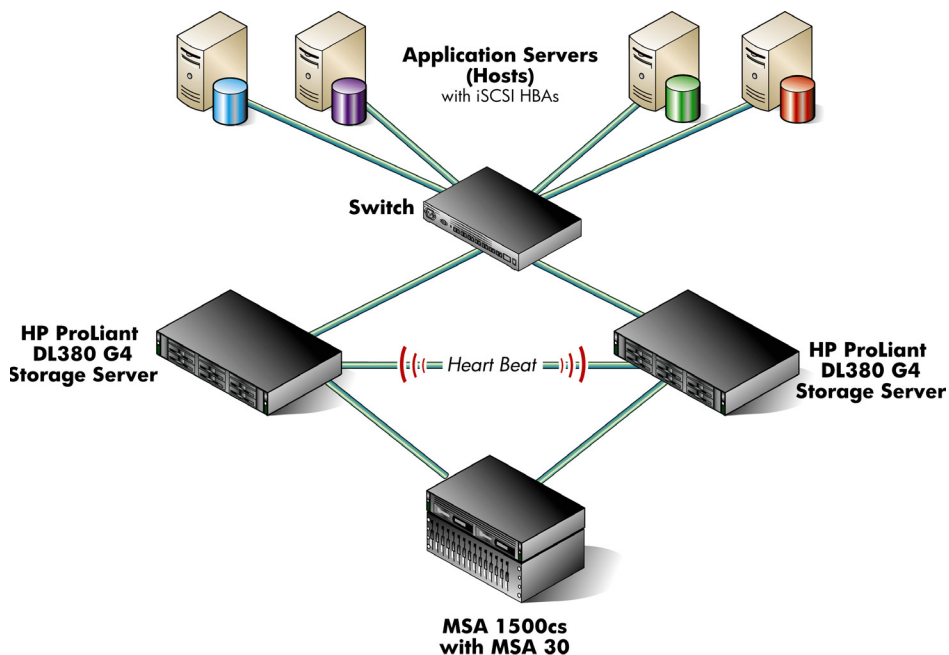
When you select **iSCSI Cluster** from the **Configuration** menu, you will see a list of the following tasks that you can perform:

- **Enable** - Enable clustering between two iSCSI Feature Packs.
- **Disable** - Disable an iSCSI cluster.
- **Suspend** - Temporarily suspend the cluster configuration.
- **Resume** - Resume a suspended cluster configuration.
- **Failover** - Manually force a failover.
- **Failback** - Manually return to the original cluster configuration.

Installation and Configuration

Prerequisites

- The servers in your cluster must have identical hardware.
- You must have a minimum of five shared logical drives available for your cluster. Microsoft Cluster Services will use one drive for its configuration information, each iSCSI Feature Pack will use one drive for configuration information, and each iSCSI Feature Pack will need at least one drive for host data.
- The ABTL (adapter, bus, target, LUN) of the shared storage must be the same when viewed from either server. To check this, connect to one of your servers in the Web Administration console and select **iSCSI** --> **Configuration** --> **iSCSI Storage**. The **Address** field shows you the ABTL that this server sees. You must then reconnect to the other server in the Administration console and check the **Address** field for the same storage. The ABTL must appear the same from both servers.
- If you already have hosts created on the iSCSI Feature Pack(s) that will become the active server(s) in your cluster, you must delete all of the portals associated with each host and do not add any new portals.
- In an active-passive cluster, the passive server cannot have any hosts or LUs.
- In an active-active cluster, the server you enable second cannot have any hosts or LUs.

Cluster Utility

The iSCSI Feature Pack's cluster configuration utility provides a streamlined and customized interface to the Windows 2003 cluster service. This utility helps configure the cluster groups required for the clustering option in an iSCSI Feature Pack. The utility requires Windows 2003 cluster service to be running.

Instructions

> NOTE: If you haven't already done so, install Microsoft Cluster Services on each iSCSI Feature Pack to be clustered.

1. Using either server, open the cluster utility using the **Start** menu (**Programs --> HP iSCSI Feature Pack --> Tools --> Cluster Configuration**) or by typing **ClusMgtUI** in the **Run** dialog box.
2. On the **Cluster Configuration Utility** window select either an **Active - Passive** or an **Active - Active** configuration.
3. Enter a name for the first group in the **Group Name** box. Use a descriptive name so that the group is easily identifiable.

4. Enter a valid IP address for the group and an appropriate subnet mask. Make sure this IP address is not in use by any computer on the network. Also, specify a preferred network adapter on which this IP address should be added. This is the IP address that would be used for all host I/O and server administration.

5. Select a configuration quorum disk. This disk would be exclusively used as the quorum drive for this group. Only raw disks are displayed in this list. For example, a non-formatted and non-partitioned disk.

6. Select a drive letter for the quorum drive. Only unused drive letters will be displayed in this list. However, ensure that the drive letter is not being used on the partner server.

7. Click the **Apply** button to create the group. Depending on your hardware this process could take a few minutes. Skip to step 14 if you are configuring an Active - Passive cluster configuration.

8. On the second section type in an appropriate group name for the second group.

9. Enter a new, valid IP address for this group. This should different from the first group's IP address. This IP address would be used for host I/O and administration of the second group.

10. Select a configuration quorum disk. This disk would be exclusively used as the quorum drive for second group.

11. Select a drive letter for the quorum drive. Only unused drive letters will be displayed in this list. However, ensure that the drive letter is not being used on the partner server.

12. Click the **Apply** button to create the second group.

13. After the groups are configured, click **Clear Local Portals**.

14. Click **Clear Remote Portals** again.

    This time you will be prompted for the partner server's username and password. Enter a username with administrative privileges.

15. Exit the **Cluster Configuration Utility**.

16. Verify that the groups are present and online using the Microsoft Cluster Administrator. Verify that each group has at least two resources. If they do not, delete the resources and the group using the Microsoft Cluster Administrator, delete the quorum drives if they were successfully formatted and then use the cluster configuration utility to create the group again.

17. Within the Microsoft Cluster Administrator, verify failover behavior of each group by right-clicking the group and selecting **Move Group**. This will change the ownership and move the resources within the group over to the partner server. Move the group once more to restore the original ownership.

18. Launch the **Microsoft Windows Server 2003 Web Administration** console and click the **iSCSI** tab.

19. From the **Configuration** screen, select **iSCSI Cluster**.

20. Click **Enable**.

21. Enter a username and password for an administrator with rights to both servers (for example, the domain administrator).

22. For an Active - Active cluster, repeat steps 18-21 for the second server.

> NOTE: Hosts should now connect using the virtual IP address of the cluster. Any hosts that were connected prior to enabling clustering need to reconnect using the virtual IP address. In addition, any replication to a server now in a cluster should be reconfigured to use the virtual IP address of the cluster.

> NOTICE: You should not change the name of a server once it is configured in a cluster. If you change a clustered server's name, Microsoft Cluster Services considers it to have failed. Therefore, server name changes should be done before configuring your Microsoft Cluster Services.

Suspending Clustering

You can temporarily suspend the cluster configuration. This is the same as pausing a node from the Microsoft Cluster Administrator. The configuration is maintained by the system and can be reactivated. To suspend clustering:

1. Select **iSCSI Cluster** from the Configuration screen.

2. Click **Suspend**.

3. Click **OK** to confirm and suspend clustering.

Resuming Clustering

You can resume a suspended cluster configuration. This is the same as resuming a node from the Microsoft Cluster Administrator. To do this:

1. Select **iSCSI Cluster** from the Configuration screen.

2. Click **Resume**.

3. Click **OK** to confirm and resume clustering.

Failover

You can manually force your iSCSI Feature Packs to failover. You might need to do this if you have to take one of the servers offline for maintenance. To force failover:

1. Select **iSCSI Cluster** from the Configuration screen.
2. Click **Failover**.
3. Click **OK** to confirm and begin the failover.

Failback

Depending upon how you have configured Microsoft Cluster Services, failback may occur automatically or manually. If it is set to manually failback, you need to force failback. Once control has returned to the primary server, the secondary server returns to its normal monitoring mode. To force failback:

1. Select **iSCSI Cluster** from the Configuration screen.
2. Click **Failback**.
3. Click **OK** to confirm and begin the failback.

Disabling Clustering

Disabling a cluster eliminates clustering and terminates all host connections. Because the configuration is not maintained by the system, it can be reactivated. Disabling only affects the iSCSI Feature Pack clustering. It has no effect on the configuration of the Microsoft Cluster Services.

NOTE: If you want to temporarily disable clustering, use **Suspend** instead.

To disable clustering:

1. Select **iSCSI Cluster** from the Configuration screen.
2. Click **Disable**.
3. Click **OK** to confirm and disable clustering.

NOTE: Hosts should now connect using the server IP address. Any hosts that were connected using the virtual IP address need to reconnect. In addition, any replication to a server that was in a cluster should be reconfigured to use the server IP address.

Snapshot Agents

Today's businesses put increasing demands on information and databases, resulting in the need for 24x7 availability and high performance. However, ever-growing capacity presents significant challenges in meeting these high availability and performance requirements.

One of the most important issues identified by system administrators is the amount of time associated with backup - and more importantly, recovery. Extreme downtime, sometimes in the range of hours or days, is often experienced while recovering corrupted or lost data.

Because it takes a significant amount of time to copy large amounts of data to tape (or other media), the source data can change before the copying is complete. Therefore, the data written to tape represents changes over a period of time and does not have 'point-in-time' referential integrity. This means that there is no guarantee that the data written to tape can be meaningfully restored.

HP iSCSI Feature Pack snapshot agents ensure that active data is protected. Complete data and transactional integrity is attained through a robust and automated process that safely and reliably takes snapshots of data for point-in-time copy purposes, third-party backup applications, and data replication.

The snapshot agents work seamlessly with the Snapshot Service, Replication Service, and Backup Enabler to notify the host to quiet activity on the disk before a snapshot is taken. This ensures that the resulting copy of data not only has "point-in-time consistency," but also has transactional integrity. This can save many hours of valuable time in the case of a disaster.

The following snapshot agents are available:

- Snapshot Agent for Microsoft® Exchange
- Snapshot Agent for Microsoft® SQL Server
- Snapshot Agent for Oracle®
- Snapshot Agent for Microsoft® VSS
- Snapshot Agent for File Systems

Snapshot Agent for Microsoft® Exchange

The Snapshot Agent for Microsoft Exchange protects Exchange databases with full point-in-time consistency by ensuring the transactional integrity of snapshots while still allowing full speed, non-stop access to the databases.

Prior to starting the snapshot process, a request is sent from the iSCSI Server to the application server running the Snapshot Agent for Microsoft Exchange. The agent briefly puts the database into backup mode and notifies the iSCSI Server that the snapshot can be performed. Once the snapshot has completed, the iSCSI Server notifies the application server and the agent takes the database out of backup mode.

Backup or replication of the read-only snapshot image is performed at high speed while Microsoft Exchange operates in normal mode. Changes made to the database do not affect what gets backed up. Meanwhile, users have full access to the database at all times.

Supported Versions

The Snapshot Agent for Microsoft Exchange is supported for the following platforms:

- Microsoft Exchange 2000 with Service Pack 3
- Microsoft Exchange 2003

Installing the Software

Installation of the snapshot agent has the following requirements:

- The snapshot agent has to be installed on the host machine where the Exchange Server is running.
- You must be an administrator or have administrator privileges in order to install the snapshot agent.

To install:

1. Insert the iSCSI Server installation CD into your CD-ROM drive.

   The wizard Welcome window opens.

2. Click **Next**.

   The Select Features window opens.

3. Click the **iSCSI Snapshot Agents** and **Exchange Server Agent** checkboxes.

4. Click **Next**.

5. Click **Install** to begin the installation.

6. When prompted enter your key code.

7. Click the **Computer Security** tab and enter a valid user name and password for the local machine.

Configuring the Snapshot Agent

You must enable snapshots for each logical unit (LU) that will use the snapshot agent. During the snapshot configuration, be sure to specify that you want to use **Snapshot Notification**. Snapshot Notification invokes the snapshot agent before a snapshot is taken.

> NOTE: We recommend that you put your Exchange database on a separate LU from your logs. These LUs should be assigned to the same group.

Running the Snapshot Agent

The snapshot agent will automatically be triggered each time a snapshot operation occurs on the Microsoft Exchange drive, such as when the iSCSI Server initiates the taking of a snapshot, replication starts, or a new backup is created via the Backup Enabler.

NOTES:

- You should wait for one snapshot operation to complete before starting another one.

- We recommend that you run snapshot operations during low-traffic periods because there may be some temporary disconnections between Outlook users and the Exchange server. If a user experiences Outlook problems after disconnecting, Microsoft recommends that the user *Exit and Log Off* from Outlook and then restart Outlook.

Advanced Topics

The snapshot agent briefly puts the database into backup mode before the snapshot is performed. If you will be using snapshot options during non-business hours or your database is small, you may prefer to have the iSCSI Server temporarily stop the Exchange services before taking the snapshot.

To set your iSCSI Server to stop the Exchange services prior to taking a snapshot:

1. Locate the following key in Regedit:

   My Computer\HKEY_LOCAL_MACHINE\SOFTWARE\FalconStor\IPStor\CurrentVersion\Agents\Agent *X*

   where *X* in *Agent X* denotes the x-th agent (*x* can equal 1,2,3,4, etc.) installed on the machine. For example, if the Exchange agent is the first agent installed, *X* will be 1.

2. Highlight each key until you find one with a key name=*Exchange*.
3. Locate the *StopServices* key.
4. Right-click to set the value to 1.

   This will cause the Exchange services to stop prior to taking a snapshot.

Uninstalling Snapshot Agent Software

Use **Add/Remove Programs** from the Control Panel to uninstall snapshot agents:

1. From the Control Panel, **Add/Remove Programs**.
2. Select the snapshot agent you want to remove and follow the on-screen instructions to uninstall the snapshot agent.

Snapshot Agent for Microsoft® SQL Server

The Snapshot Agent for Microsoft SQL Server protects Microsoft SQL Server databases with full point-in-time consistency by ensuring the transactional integrity of snapshots while still allowing full speed, non-stop access to the databases.

Prior to starting the snapshot process, a request is sent from the iSCSI Server to the application server running the Snapshot Agent for Microsoft SQL Server. The agent forces all data in the database's cache to be written to disk and notifies the iSCSI Server that the snapshot can be performed.

Backup or replication of the read-only snapshot image is performed at high speed while Microsoft SQL Server operates in normal mode. Changes made to the database do not affect what gets backed up. Meanwhile, users have full access to the database at all times.

Supported Versions

The Snapshot Agent for Microsoft SQL Server 2000 is supported.

Installing the Software

Installation of the snapshot agent has the following requirements:

- The snapshot agent has to be installed on the host machine where the SQL Server database is running.
- You must be an administrator or have administrator privileges in order to install the snapshot agent.

To install:

1. Insert the iSCSI Server installation CD into your CD-ROM drive.

   The wizard Welcome window opens.

2. Click **Next**.

   The Select Features window opens.

3. Click the **iSCSI Snapshot Agents** and **SQL Server Agent** checkboxes.

4. Click **Next**.

5. Click **Install** to begin the installation.

6. When prompted enter your key code.

7. Click the **Computer Security** tab and enter a valid user name and password for the local machine.

Configuring the Snapshot Agent

You must enable snapshots for each logical unit (LU) that will use the snapshot agent. During the snapshot configuration, be sure to specify that you want to use **Snapshot Notification**. Snapshot Notification invokes the snapshot agent before a snapshot is taken.

> NOTE: If your SQL Server database uses multiple LUs, these LUs should be assigned to the same group.

Running the Snapshot Agent

The snapshot agent will automatically be triggered each time a snapshot operation occurs on the Microsoft SQL Server drive, such as when a new snapshot is taken, replication starts, or a new backup is created via the Backup Enabler.

Uninstalling Snapshot Agent Software

Use **Add/Remove Programs** from the Control Panel to uninstall snapshot agents:

1. From the Control Panel, **Add/Remove Programs**.
2. Select the snapshot agent you want to remove and follow the on-screen instructions to uninstall the snapshot agent.

Snapshot Agent for Oracle®

The Snapshot Agent for Oracle protects Oracle databases with full point-in-time consistency by ensuring the transactional integrity of snapshots while still allowing full speed, non-stop access to the databases.

Prior to starting the snapshot process, a request is sent from the iSCSI Server to the application server running the Snapshot Agent for Oracle. The agent places the Oracle database in "backup" mode and notifies the iSCSI Server that the snapshot can be performed. While in "backup" mode, the database is "frozen" and Oracle sends all new incoming data to the Oracle "online redo logs". Once the snapshot has completed, the iSCSI Server notifies the application server and the agent places the database back into normal mode, synchronizing all data back to the database.

Backup or replication of the read-only snapshot image is performed at high speed while Oracle operates in normal mode. Changes made to the database do not affect what gets backed up. Meanwhile, users have full access to the database at all times.

Supported Versions

The Snapshot Agent for Oracle supports Oracle 8*i*, 9*i*, and 10*g*.

Installing the Software

Installation of the snapshot agent has the following requirements:

- The snapshot agent has to be installed on the host machine where the Oracle database is running.
- You must be an administrator or have administrator privileges in order to install the snapshot agent.

To install:

1. Insert the iSCSI Server installation CD into your CD-ROM drive.

   The wizard Welcome window opens.

2. Click **Next**.

   The Select Features window opens.

3. Click the **iSCSI Snapshot Agents** and **Oracle Agent** checkboxes.

4. Click **Next**.

5. Click **Install** to begin the installation.

6. When prompted enter your key code.
7. Click the **Computer Security** tab and enter a valid user name and password for the local machine.
8. Click the **Oracle** tab and enter the user name and password of the Oracle administrator and enter the Oracle instance name.

    The user name and password are used by the iSCSI Server to access your database. When the Oracle database is set up initially, the default system user password is usually *manager*.

Configuring the Snapshot Agent

You must enable snapshots for each logical unit (LU) that will use the snapshot agent. During the snapshot configuration, be sure to specify that you want to use **Snapshot Notification**. Snapshot Notification invokes the snapshot agent before a snapshot is taken.

> NOTE: If your Oracle database uses multiple LUs, these LUs should be assigned to the same group.

Running the Snapshot Agent

The snapshot agent will automatically be triggered each time a snapshot operation occurs on the Oracle drive, such as when a new snapshot is taken, replication starts, or a new backup is created via the Backup Enabler.

Uninstalling Snapshot Agent Software

Use **Add/Remove Programs** from the Control Panel to uninstall snapshot agents:

1. From the Control Panel, **Add/Remove Programs**.
2. Select the snapshot agent you want to remove and follow the on-screen instructions to uninstall the snapshot agent.

Snapshot Agent for Microsoft® VSS

The Snapshot Agent for Microsoft VSS protects VSS-aware drives with full point-in-time consistency while still allowing non-stop access to the data.

Prior to starting the snapshot process, a request is sent from the iSCSI Server to the application server running the Snapshot Agent for Microsoft VSS. The agent forces all data in the drive's cache to be written to disk and notifies the iSCSI Server that the snapshot can be performed.

Backup or replication of the read-only snapshot image continues at high speed while the drive operates in normal mode. Changes made to the drive do not affect what gets backed up or replicated. Meanwhile, users have full access to the drive at all times.

Supported Versions

The Snapshot Agent for Microsoft VSS is supported for VSS-aware drives.

> NOTE: The Snapshot Agent for Microsoft VSS does not support dynamic disks.

Installing the Software

Installation of the snapshot agent has the following requirements:

- The snapshot agent has to be installed on the host machine.
- You must be an administrator or have administrator privileges in order to install the snapshot agent.
- Your host must have the Microsoft initiator in order to use the snapshot agent.
- The VSS Hardware provider cannot be installed. You must uninstall it first before installing the Snapshot Agent for Microsoft VSS.

To install:

1. Insert the iSCSI Server installation CD into your CD-ROM drive.

   The wizard Welcome window opens.

2. Click **Next**.

   The Select Features window opens.

3. Click the **iSCSI Snapshot Agents** and **Microsoft VSS Agent** checkboxes.

4. Click **Next**.

5. Click **Install** to begin the installation.

6. When prompted enter your key code.

7. Click the **Computer Security** tab and enter a valid user name and password for the local machine.

8. Click the **Storage Server Security** tab and enter a valid user name and password for the iSCSI Server.

Configuring the Snapshot Agent

You must enable snapshots for each logical unit (LU) that will use the snapshot agent. During the snapshot configuration, be sure to specify that you want to use **Snapshot Notification**. Snapshot Notification invokes the snapshot agent before a snapshot is taken.

Running the Snapshot Agent

The snapshot agent will automatically be triggered each time a snapshot operation occurs on the Microsoft VSS drive, such as when the iSCSI Server initiates the creation of a new snapshot, replication starts, or a new backup is created via the Backup Enabler.

In addition, if you perform host-based backups using VSS-aware third-party backup software, the snapshot agent will be triggered when a snapshot is taken.

Mounting or Rolling Back a Snapshot on a VSS Volume

After a snapshot is mounted or rolled back for a VSS volume, it is automatically set to read-only. In order to set it for read/write access, we have included a utility that you can run on the host machine.

1. From a command prompt on the host machine, go to the following directory:

   \program files\HP\iSCSI\Client

2. Type **unlocklu /list** to see a list of all disks. For example:

   ```
   D:\vss>unlocklu /list
   Disk volumes:
   Disk0: [CD-ROM 52X-B0]
   Disk1: [ST340015A]
   Disk2: [ST340015A]
   Disk3: [ST340015A]
   Disk4: [ST340015A]
   *Disk5: [HP ] ReadOnly Hidden
   ```

   Note that disks marked with an asterisk (*) are your iSCSI Server disks.

3. Unlock the disk by typing **unlocklu /clear *<disknumber>***.

   Using the above example, you would type: unlocklu /clear disk5

4. Log the host back into the target.

   Launch the Microsoft iSCSI initiator on the host machine and log off (from the **Active Sessions** tab) and then log on (from the **Available Targets** tab). This will temporarily disconnect the host.

Changing an iSCSI Server Hostname

Changing the iSCSI Server hostname will result in authentication failures if running the Snapshot Agent for Microsoft VSS Agent on iSCSI host machines. To re-establish authentication of the agent, do the following:

1. Open the Snapshot for VSS configuration utility.
2. Click on the **Storage Server Security** tab.
3. Make all necessary changes and click **OK**.

Uninstalling Snapshot Agent Software

Use **Add/Remove Programs** from the Control Panel to uninstall snapshot agents:

1. From the Control Panel, **Add/Remove Programs**.
2. Select the snapshot agent you want to remove and follow the on-screen instructions to uninstall the snapshot agent.

Snapshot Agent for File Systems

The Snapshot Agent for file systems protects data with full point-in-time consistency while still allowing full speed, almost non-stop access to the data.

Prior to starting the snapshot process, all disk cache and buffers are flushed to disk.

Backup or replication of the read-only snapshot image is performed at high speed while the file system operates in normal mode. Changes made to the data do not affect what gets backed up. Meanwhile, users have full access to the data at all times.

Supported Version

The file system agent supports Windows 2003, Windows 2000, Windows XP, and Windows NT.

Installing the Software

Installation of the snapshot agent has the following requirements:

- The snapshot agent has to be installed on a host machine.
- You must be an administrator or have administrator privileges in order to install the snapshot agent.

To install:

1. Insert the iSCSI Server installation CD into your CD-ROM drive.

   The wizard Welcome window opens.

2. Click **Next**.

   The Select Features window opens.

3. Click the **iSCSI Snapshot Agents** and **File System Agent** checkboxes.
4. Click **Next**.
5. Click **Install** to begin the installation.
6. When prompted enter your key code.
7. Click the **Computer Security** tab and enter a valid user name and password for the local machine.

Configuring the Snapshot Agent

You must enable snapshots for each logical unit (LU) that will use the snapshot agent. During the snapshot configuration, be sure to specify that you want to use **Snapshot Notification**. Snapshot Notification invokes the snapshot agent before a snapshot is taken.

Running the Snapshot Agent

The snapshot agent will automatically be triggered each time a snapshot operation occurs on the host, such as when a new snapshot is taken, replication starts, or a new backup is created via the Backup Enabler.

Uninstalling Snapshot Agent Software

Use **Add/Remove Programs** from the Control Panel to uninstall snapshot agents:

1. From the Control Panel, **Add/Remove Programs**.
2. Select the snapshot agent you want to remove and follow the on-screen instructions to uninstall the snapshot agent.

Command Line Interface

The iSCSI command line utility (iSCSICLI) provides a non-graphical interface for configuring and querying the iSCSI system. The main purpose of the iSCSICLI is for use in unattended/automated scripting through use of batch files and the Windows scheduler.

Command Line Basics

The iSCSICLI receives its input in the form of global options, commands, and parameters. Generally these are supplied to the CLI in this order.

Any error messages are directed to standard error (stderr), whereas output from query-type commands (for example, to show known hosts in the system) is directed to standard output (stdout).

Command Line Overview

The basic command line usage model is:

```
iscsicli [/server:server] [/user:username] [/pw:password] [/q]
<command> <operation> [parameters]
```

As an example, to display a formatted list of all physical storage:

```
iscsicli device show
```

Global Options

These represent the command line options to control system wide modes and features of the command line. These are required to be the first arguments provided to the CLI.

Command Classes

The command classes represent the primary operational categories of the command line. Each category contains operations and parameters. Commands are entered directly on the command line.

The primary command classes are:

Command Class	Description	Operations
Device	Storage in the form of physical disks	Reserve, release, adopt, rescan, layout, show, showforeign
File	Storage in the form of files	Create, delete, expand, and show
Pool	Collection of one or more physical devices or files	Create, delete, rename, add, remove, merge, and show
Host	iSCSI host that makes use of the logical units (LUs)	Create, delete, add, remove, addportal, removeportal, assign, unassign, setaccess, setauth, setresolve, and show
LU	LUs (as viewed by a host) allocated from a storage pool	Create, import, delete, rename, expand, assign, unassign, setaccess, layout, and show
Snapshot	Create and delete snapshots on LUs	Enable, disable, create, remove, mount, dismount, copy, rollback, setarea, list, and show
SnapshotGroup	Create and delete snapshot groups	Create, remove, reset, assign, unassign, and show
Replication	Asynchronous replication of LUs	Enable, disable, bind, start, stop, promote, rollback, and show
Backup	Create and mount snapshots for local backup of raw devices	Enable, disable, create, remove, newsnap, delsnap, mount, dismount, list, and show
Restore	Mount and dismount snapshots of local backups	Mount, dismount
Cluster	Cluster pair of iSCSI Feature Packs	Enable, disable, suspend, resume, failover, failback, list, and show
Configuration	Configuration settings	Backup, restore, xray
iSNS	iSNS settings	Setmode and show
iSCSI	iSCSI settings	Add, remove, reset, show, addportal, removeportal, removeallportals, and showportal

Command Parameters

Parameters are specified using the parameter name and the value separated by an equal sign. For example:

```
Poolname=MyNewsPool
```

Parameter values that contain spaces must be enclosed in double-quotes:

```
"Poolname=My News Pool"
```

The parameter definition table contains a type field that can contain one of the following values:

- R – Required parameter
- C – Conditional parameter, may be required based on other parameters
- O – Optional parameter

Command Line Status

Success or failure of a requested operation can be determined through examination of the command exit code: %ERRORLEVEL%

Possible return codes are:

- 0 – successful execution of request
- 1 – must run command as Administrators
- 2 – unable to login to iSCSI Feature Pack
- 3 – invalid option
- 4 – invalid command
- 5 – invalid operation
- 6 – invalid parameter
- 7 – missing one or more required parameters
- 101 – remote iSCSI Feature Pack not found
- 102 - file i/o or system API failure
- 103 – failed to allocate memory
- 104 – internal failure (data corruption)

Global Options

iSCSICLI recognizes the following global options.

Remote iSCSI Feature Pack (/server)

Specify the iSCSI Feature Pack that you wish to query/configure. If no server is specified then the operations are assumed to be directed to the machine your running the iSCSICLI from; the local host.

The complete definition of this option is:

```
/server:servername
```

Remote iSCSI Feature Pack User & Password (/user, /pw)

When configuring a remote iSCSI Feature Pack, the login credentials for this server will be required.

The complete definition of this option is:

```
/user:username /pw:password
```

Display Usage and Help (/h)

Show basic command line syntax.

Quiet Mode (/q)

Suppresses the output of informational and error messages to stderr. Success or failure of the requested operation can be determined by examining the return code (see **Command Line Status**).

Device Commands

Physical storage represents physical disks and disk volumes.

The operation class name is: **device**

Under the device operational class you can specify the following sub-operations:

reserve

Assign physical devices to an iSCSI Storage Pool.

Parameter	Type	Description
Device	R	The physical device to reserve for use by iSCSI. The format is: adapter:bus:target:lun
Pool	R	Pool to add the storage into. The pool must already exist.

Example:

```
iscsicli device reserve device=0:0:0:2 pool=Pool1
```

release

Remove a physical device from an iSCSI Storage Pool.

Parameter	Type	Description
Device	R	The physical device to release (free) from use by iSCSI. The format is: adapter:bus:target:lun
Pool	R	Pool to remove the storage from. The pool must already own the device.

Example:

```
iscsicli device release device=0:0:0:2 pool=Pool1
```

adopt

Adopt a foreign iSCSI disk for the purposes of disaster recovery.

Parameter	Type	Description
Device	R	The physical device to adopt. The format is: adapter:bus:target:lun

Example:

```
iscsicli device adopt device=1:0:0:2
```

rescan

Rescan all physical devices.

Example:

```
iscsicli device rescan
```

layout

Display the layout of resource segments on the device.

Parameter	Type	Description
Device	R	The physical device for which to display the layout. The format is: adapter:bus:target:lun

Example:

```
iscsicli device layout device=0:0:0:2
```

show

Display physical devices, their status and pool associations.

Parameter	Type	Description
Device	O	The physical device to display. The format is: adapter:bus:target:lun If not specified, all physical devices will be displayed.

Example:

```
iscsicli device show device=0:0:0:2
```

showforeign

List disks available to be adopted.

Example:

```
iscsicli device showforeign
```

File Storage Commands

File storage is used on systems where no unused physical disks and/or disk volumes are available.

The operation class name is: **file**

Under the device operational class you can specify the following sub-operations:

create

Create a file to be used by iSCSI.

Parameter	Type	Description
Volume	R	The volume to create the file storage for use by iSCSI. Use the **Device Show** command to see the possible values.
Size	O	Size (in MB) of the file. Default: available space

Example:

```
iscsicli file create volume="\\?\Volume{118be50e-eac1-11d7-a1f7-
505054503030}\" size=2048
```

delete

Remove a file from use and delete the file.

Parameter	Type	Description
Device	R	The physical file based device to delete. The format is: adapter:bus:target:lun

Example:

```
iscsicli file delete device=0:0:0:2
```

expand

Expand a file used by iSCSI.

Parameter	Type	Description
Device	R	The physical file based device to expand. The format is: adapter:bus:target:lun
Size	R	Size (in MB) of the file.

Example:

```
iscsicli file expand device=0:0:0:2 size=1024
```

show

Display file and status.

Parameter	Type	Description
Device	O	The file device to display. The format is: adapter:bus:target:lun

Example:

```
iscsicli file show
```

Storage Pool Commands

By default all physical storage, when reserved, exists within the context of a storage pool. The storage pool can contain one or more physical storage devices of potentially dissimilar categories: disk, volume or file. A storage pool must contain at least one device.

The operation class name is: **pool**

Under the device operational class you can specify the following sub-operations:

create

Create a storage pool.

Parameter	Type	Description
Pool	R	Name of the new storage pool.
Device	O	The physical device to add to the newly created pool. The format is: adapter:bus:target:lun
		The storage must have been previously reserved.

Example:

```
iscsicli pool create pool=Pool1 device=0:0:0:1
```

delete

Remove a storage pool.

Parameter	Type	Description
Pool	R	Name of the pool.

Example:

```
iscsicli pool delete pool=Pool2
```

rename

Rename a storage pool.

Parameter	Type	Description
Pool	R	Name of the pool.
Newname	R	New name of the pool.

Example:

```
iscsicli pool rename pool=Pool2 "newname=My Pool"
```

add

Add a physical device or file to a storage pool.

Parameter	Type	Description
Pool	R	Name of the pool.
Device	C	The physical device to add to the pool. The format is: adapter:bus:target:lun The storage must have been previously reserved.

Example:

```
iscsicli pool add pool=Pool1 device=0.0.0.4
```

remove

Remove a physical device or file from a storage pool.

Parameter	Type	Description
Pool	R	Name of the pool.
Device	C	The physical device to remove from the pool. The format is: adapter:bus:target:lun

Example:

```
iscsicli pool remove pool=Pool1 device=0.0.0.3
```

merge

Merge storage pools.

Parameter	Type	Description
Pool	R	Name of the first pool.
Pool2	R	Name of the second pool.
Newname	R	Name for the merged pool.

Example:

```
iscsicli pool merge pool=Pool1 pool2=Pool2 "newname=My Pool"
```

show

Display pools.

Parameter	Type	Description
Pool	O	Name of the pool. If not specified, all pools will be displayed.

Example:

```
iscsicli pool show pool=Pool1
```

Host Commands

iSCSI hosts make use of LUs.

The operation class name is: **host**

Under the host operational class you can specify the following sub-operations:

create

Define a new host.

Parameter	Type	Description
Host	R	Name of the new host.
Initiator	R	iSCSI initiator to associate with this host.

AuthMode	O	Authentication mode used by this host.
		    Choices: none, chap, mutualchap
		    Default: none

User	C	User name for chap and mutual chap authentication type.
Chap	C	Server/Target Chap secret for chap and mutual chap authentication type.
MutualChap	C	Initiator/Host MutualChap secret for mutual chap authentication type.

ResolveBy	O	How the host should connect to the server.
		    Choices: address, name
		    Default: address

dnsname	C	DNS server name.

Example:

```
iscsicli host create host=MyServer initiator=iqn.1991-
05.com.microsoft:myserver authmode=chap user=user1 chap=secret
ResolveBy=address
```

delete

Remove a defined host.

Parameter	Type	Description
Host	R	Name of the host.

Example:

```
iscsicli host delete host=MySQLServer
```

add

Add an iSCSI initiator to a host.

Parameter	Type	Description
Host	R	Name of the host.
Initiator	R	iSCSI initiator name to add.

Example:

```
iscsicli host add host=MySQLServer initiator=iqn.1991-
05.com.microsoft:mysqlserver
```

remove

Remove an iSCSI initiator from a host.

Parameter	Type	Description
Host	R	Name of the host.
Initiator	R	iSCSI initiator name to remove.

Example:

```
iscsicli host remove host=MySQLServer initiator=iqn.1991-
05.com.microsoft:mysqlserver
```

addportal

Add an iSCSI portal to a host.

Parameter	Type	Description
Host	R	Name of the host.
Portal	R	iSCSI portal to add to the host. The format is: ipaddress[:port[:group]]

Example:

```
iscsicli host addportal host=MySQLServer portal=10.1.11.72:3260:1
```

removeportal

Remove an iSCSI portal from a host.

Parameter	Type	Description
Host	R	Name of the host.

Parameter	Type	Description
Portal	R	iSCSI portal to remove from the host. The format is: ipaddress[:port[:group]]

Example:

```
iscsicli host removeportal host=MySQLServer portal=10.1.11.72:3260:1
```

assign

Assign a LU to a host.

Parameter	Type	Description
Host	R	Name of the host.
LU	R	LU to assign to the host.
AccessMode	O	Type of access to grant to hosts. Choices: RO, RW, RWE Default: RWE

Example:

```
iscsicli host assign host=MySQLServer lu=LU6 accessmode=RO
```

unassign

Remove the assignment of a LU from a host.

Parameter	Type	Description
Host	R	Name of the host.
LU	R	LU to unassign from the host.

Example:

```
iscsicli host unassign host=MySQLServer lu=LU6
```

setaccess

Change the access mode of a LU for a host.

Parameter	Type	Description
Host	R	Name of the host.
LU	R	LU to assign to the host.
AccessMode	R	Type of access to grant to hosts. Choices: RO, RW, RWE

Example:

```
iscsicli host setaccess host=MySQLServer lu=LU6 accessmode=RWE
```

setauth

Change the authentication for the specified host.

Parameter	Type	Description
Host	R	Name of the host.

AuthMode	O	Authentication mode used by this host.
		    Choices: none, chap, mutualchap
		    Default: none

Chap	C	Server/Target Chap secret for chap and mutual chap authentication type.
MutualChap	C	Initiator/Host Mutual Chap secret for mutual chap authentication type.

Example:

```
iscsicli host setauth host=MySQLServer authmode=chap chap=secret
```

setresolve

Change the way the host connects to the server.

Parameter	Type	Description
Host	R	Name of the host.

ResolveBy	R	How the host should connect to the server.
		    Choices: address, name
		    Default: address

dnsname	C	DNS server name.

Example:

```
iscsicli host setresolve host=MyServer ResolveBy=address
```

show

Show information about one or more hosts.

Parameter	Type	Description
Host	R	Name of the host. If not specified, all hosts will be displayed.

Example:

```
iscsicli host show host=MySQLServer
```

Logical Unit Commands

LUs are devices used by the iSCSI hosts.

The operation class name is: **logicalunit** or **lu**

Under the LU operational class you can specify the following sub-operations:

create

Create a new LU.

Parameter	Type	Description
LU	R	Name of the new LU.
Pool or Disk	R	Pool or Disk to provide storage for the LU.
Size	O	Size (in MB) of the new LU. Default: available space
Host	O	Host to assign to the LU.
AccessMode	O	Type of access to grant to hosts. Choices: RO, RW, RWE Default: RWE

Examples:

```
iscsicli lu create lu=LU4 pool=Pool1 size=1024 host=MySQLServer
accessmode=RO

iscsicli lu create lu=LU4 disk=0:2:2:2 size=1024 host=MySQLServer
accessmode=RW
```

import

Import a physical device as a new LU.

Parameter	Type	Description
LU	R	Name of the new LU.
Device	R	The physical device to import. The format is: adapter:bus:target:lun The storage must have been previously formatted by a supported operating system.
Pool or Disk	R	Pool or Disk to store the header information for the imported physical device.
Host	O	Host to assign the LU.

Parameter	Type	Description
AccessMode	O	Type of access to grant to hosts.
		Choices: RO, RW, RWE
		Default: RWE

Example:

```
iscsicli lu import lu=LU5 pool=ImportLU5 host=MySQLServer accessmode=RO
iscsicli lu import lu=LU5 disk=0:2:2:2 host=MySQLServer accessmode=RO
```

delete

Delete a LU.

Parameter	Type	Description
LU	R	Name of the LU.

Example:

```
iscsicli lu delete lu=LU6
```

rename

Rename a LU.

Parameter	Type	Description
LU	R	Name of the LU.
Newname	R	New name of the LU.

Example:

```
iscsicli lu rename lu=LU6 newname=MyLU6
```

expand

Expand a LU.

Parameter	Type	Description
LU	R	Name of the LU.
Size	R	Size (in MB) to add to the LU.

Example:

```
iscsicli lu expand lu=LU6 size=4096
```

assign

Assign a LU to an iSCSI host.

Parameter	Type	Description
LU	R	Name of the LU.
Host	R	Host to assign to the LU.

AccessMode	O	Type of access to grant to hosts.
		    Choices: RO, RW, RWE
		    Default: RWE

Example:

```
iscsicli lu assign lu=LU6 host=MySQLServer accessmode=RW
```

unassign

Remove the assignment of a LU from an iSCSI host.

Parameter	Type	Description
LU	R	Name of the LU.
Host	R	Host to unassign from the LU.

Example:

```
iscsicli lu unassign lu=LU6 host=MySQLServer2
```

setaccess

Change the access mode of a LU for an iSCSI host.

Parameter	Type	Description
LU	R	Name of the LU.
Host	R	Host to assign to the LU.
AccessMode	R	Type of access to grant to hosts. Choices: RO, RW, RWE

Example:

```
iscsicli lu setaccess lu=LU6 host=MySQLServer accessmode=RO
```

layout

Display the layout of the LU and its resources among the physical devices.

Parameter	Type	Description
LU	R	The LU for which to display the layout.

Example:

```
iscsicli lu layout lu=LU6
```

show

Display LU(s).

Parameter	Type	Description
LU	O	Name of the LU. If none specified, all LUs will be displayed.

Example:

```
iscsicli lu show lu=LU9
```

Snapshot Commands

Snapshots preserve point-in-time images of groups or LUs.

The operation class name is: **snapshot**

Under the snapshot operational class you can specify the following sub-operations:

enable

Enable snapshots for a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.
Pool or Disk	O	Pool or Disk to provide additional storage. Default: original disk or pool used to create the LU.
Percentage	R	Size to allocate for snapshot area given as a percentage of the size of the LU.
AutoExpand	O	Automatically expand snapshot area. Choices: Yes, No Default: No
ExpandBy	C	Size to auto expand given as a percentage of the size of the snapshot area.
MaxSize	C	Maximum size (in MB) for auto expand.
MinFree	O	Minimum free space (as a percentage of disk size) to trigger auto expand. Default: 10% of size
NotifyHost	O	Notify hosts when snapshots are created. Choices: Yes, No Default: Yes

Example:

```
iscsicli snapshot enable lu=LU7 percentage=20 autoexpand=Y expandby=10
maxsize=512 minfree=20
```

> NOTE: This will not create the snapshot area if snapshots have already been enabled under the **replication** or **backup** commands.

disable

Disable snapshots for a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.

Example:

```
iscsicli snapshot disable lu=LU6
```

NOTE: The snapshot area is also used by the backup options. If neither of those options are enabled, disabling snapshots will also free the snapshot area.

create

Create a new snapshot of a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.
Comment	O	Description of the snapshot
		The description must be enclosed in quotation marks.

Example:

```
iscsicli snapshot create lu=LU5 comment="Friday Snapshot"
```

remove

Remove a snapshot of a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.
Snapshot	R	Name of the snapshot to remove. The format is YYYY/MM/DD HH:MM:SS..

Example:

```
iscsicli snapshot remove lu=LU7 snapshot=2004/08/19 12:00:00
```

mount

Mount a snapshot of a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.

Parameter	Type	Description
Snapshot	R	Name of the snapshot to mount. The format is YYYY/MM/DD HH:MM:SS. Specify *last* to mount the last snapshot that was created.
NewName	O	Name of the new LU to mount. If not specified, the name will be: logical_unit_name@snapshot_name

Example:

```
iscsicli snapshot mount lu=LU7 snapshot=2004/08/19 12:00:00 newname=
LU7@1-AUG-2004.at.noon
```

Dismount

Dismount a snapshot of a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.
Snapshot	R	Name of the snapshot to dismount. The format is YYYY/MM/DD HH:MM:SS. Specify *last* to dismount the last snapshot that was created.

Example:

```
iscsicli snapshot dismount lu=LU7 snapshot=2004/08/19 12:00:00
```

copy

Copy a snapshot of a LU to a new LU.

Parameter	Type	Description
LU	R	Name of the LU.
Pool or Disk	R	Pool or Disk on which to create the LU of snapshot.
Snapshot	R	Name of the snapshot to copy. The format is YYYY/MM/DD HH:MM:SS.
NewName	O	Name of the new LU to create. If not specified, the name will be: Copy_of_*logical_unit_name@snapshot_name*

Example:

```
iscsicli snapshot copy lu=LU7 pool=Pool1 snapshot=2004/08/19 12:00:00
"newname=Copy of LU7 on 1-AUG-2004 at Noon"
```

rollback

Rollback a group or LU to the image saved in a snapshot.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.
Snapshot	R	Name of the snapshot to roll back to. The format is YYYY/MM/DD HH:MM:SS.

Example:

```
iscsicli snapshot rollback lu=LU7 snapshot=2004/08/19 12:00:00
```

setarea

Modify an existing snapshot area for a group or LU. This modifies the area for all applicable data availability services: snapshot, replication, and backup.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.
Percentage	R	Size to allocate for snapshot area given as a percentage of the size of the LU.
AutoExpand	O	Automatically expand snapshot area. Choices: Yes, No Default: No
ExpandBy	C	Size to auto expand given as a percentage of the size of the snapshot area.
MaxSize	C	Maximum size (in MB) for auto expand.
MinFree	O	Minimum free space (as a percentage of disk size) to trigger auto expand. Default: 10% of size

NotifyHost	O	Notify hosts when snapshots are created.
		    Choices: Yes, No
		    Default: Yes

Example:

```
iscsicli snapshot setarea lu=LU7 percentage=20 autoexpand=Y expandby=10
maxsize=512 minfree=20
```

list

List snapshots of a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.

Example:

```
iscsicli snapshot list lu=LU7
```

show

Show snapshot status information and list the snapshots of a LU.

Parameter	Type	Description
LU	R	Name of the LU.

Example:

```
iscsicli snapshot show lu=LU7
```

Snapshot Group Commands

Groups link LUs together for snapshot synchronization purposes.

The operation class name is: **snapshotgroup** or **sg.**

Under the Snapshot Group operational class you can specify the following sub-operations:

create

Create a new group.

Parameter	Type	Description
Group	R	Name of the new group.
EnableSnapshot	O	Enable snapshot for this group. Choices: Yes, No Default: Yes
EnableBackup	O	Enable backup for this group. Choices: Yes, No Default: No
EnableReplication	O	Enable replication for this group. Choices: Yes, No Default: No
NotifyHost	O	Notify hosts when snapshots are created. Choices: Yes, No Default: Yes

Example:

```
iscsicli snapshotgroup create group=group4 enablebackup=yes
```

reset

Change settings for a group. Only those parameters you specify will be used to change the current group.

Parameter	Type	Description
Group	R	Name of the group.
EnableSnapshot	O	Enable snapshot for this group.
		Choices: Yes, No
EnableBackup	O	Enable backup for this group.
		Choices: Yes, No
EnableReplication	O	Enable replication for this group.
		Choices: Yes, No
NotifyHost	O	Notify hosts when snapshots are created.
		Choices: Yes, No

Example:

```
iscsicli snapshotgroup reset group=group4 enablereplication=yes server=
MyServer user=Administrator pw=Password
```

remove

Remove a group.

Parameter	Type	Description
Group	R	Name of the group.
Force	O	(For groups with replication enabled.) Remove the group even if the system cannot connect to the replica server. You must manually delete from replica server.
		Choices: Yes, No
		Default: No

Example:

```
iscsicli snapshotgroup remove group=group5
```

assign

Assign LUs to a group.

Parameter	Type	Description
LU	R	Name of the LU.
Group	R	Group to assign to the LU.
Resync	O	Reserved for future use.

Example:

```
iscsicli snapshotgroup assign lu=LU6 group=group4
```

unassign

Remove the assignment of a LU from an group.

Parameter	Type	Description
LU	R	Name of the LU.
Group	R	Group to unassign from the LU.
Force	O	(For groups with replication enabled.) Unassign the LU even if the system cannot connect to the replica server. You must perform maintenance manually on the replica server. Choices: Yes, No Default: No

Example:

```
iscsicli snapshotgroup unassign lu=LU6 group=group4
```

show

List groups.

Parameter	Type	Description
Group	R	Name of the group.

Example:

```
iscsicli group show
```

Replication Commands

Asynchronous replication creates and maintains point-in-time images of LUs to duplicate LUs on a second, remote iSCSI Server.

The operation class name is: **replication**

Under the replication operational class you can specify the following sub-operations:

enable

Enable replication for a LU.

Parameter	Type	Description
LU	R	Name of the LU.
Server	R	Name/IP address of the replica server.
User	R	NT account name on the replica server.
PW	R	Password for NT account name on the replica server.
Pool or Disk	R	Target server pool or disk to provide storage for the replica.
SnapPool or SnapDisk	O	Pool or disk to provide storage for the local snapshot area to be used by replication.
RemSnapPool or RemSnapDisk	O	Target server pool or disk to provide storage for the target snapshot area to be used by replication.
Percentage	C	Size to allocate for local and/or target snapshot area given as a percentage of the size of the LU. Required if SnapPool, SnapDisk, RemSnapPool, or RemSnapDisk is specified.

AutoExpand	O	Automatically expand local and/or target snapshot area(s)
		    Choices: Yes, No
		    Default: No

ExpandBy	C	Size to auto expand given as a percentage of the size of the snapshot area.
MaxSize	C	Maximum size (in MB) for auto expand.
MinFree	C	Minimum free space (as a percentage of disk size) to trigger auto expand. Default: 10% of size

NotifyHost	O	Notify hosts when snapshots are created.
		    Choices: Yes, No
		    Default: Yes

Example:

```
iscsicli replication enable lu=LU7 server=MyServer user=Administrator
pw=Password pool=targetpool1 snappool=localpool1 remsnappool=
targetpool2 percentage=20 autoexpand=Y expandby=10 maxsize=512 minfree=
20
```

NOTE: This will not create the snapshot area if snapshots have already been enabled under the **snapshot** or **backup** commands.

disable

Disable replication of a LU.

Parameter	Type	Description
LU	R	Name of the LU.

Example:

```
iscsicli replication disable lu=LU7
```

NOTE: The snapshot area is also used by the snapshot and backup options. If neither of those options are enabled, disabling snapshots will also free the snapshot area.

bind

Configure replication of a LU to a second replica LU on another iSCSI server.

Parameter	Type	Description
LU	R	Name of the LU.
Server	R	Name of the remote server.
User	R	User name used to connect to the remote server.
PW	R	Password used to connect to the remote server.
Replica	R	Name of the LU to use as the replica on the remote server. The LU must already exist.
SnapPool or SnapDisk	O	Pool or disk to provide storage for the local snapshot area to be used by replication.
RemSnapPool or RemSnapDisk	O	Target server pool or disk to provide storage for the target snapshot area to be used by replication.
Percentage	C	Size to allocate for local and/or target snapshot area given as a percentage of the size of the LU. Required if SnapPool, SnapDisk, RemSnapPool, or RemSnapDisk is specified.
AutoExpand	O	Automatically expand local and/or target snapshot area(s) 　　Choices: Yes, No 　　Default: No
ExpandBy	C	Size to auto expand given as a percentage of the size of the snapshot area.
MaxSize	C	Maximum size (in MB) for auto expand.
MinFree	C	Minimum free space (as a percentage of disk size) to trigger auto expand. 　　Default: 10% of size
NotifyHost	O	Notify hosts when snapshots are created. 　　Choices: Yes, No 　　Default: Yes

Example:

```
iscsicli replication bind lu=LU7 server=iSCSI2 user=Admin pw=password
"replica=Replica of LU7 on iSCSI1"
```

start

Start replication of a LU.

Parameter	Type	Description
LU	R	Name of the LU.

Example:

```
iscsicli replication start lu=LU7
```

stop

Stop replication of a LU.

Parameter	Type	Description
LU	R	Name of the LU.

Example:

```
iscsicli replication stop lu=LU7
```

promote

Promote a replica LU. This will also unbind the replica from the original.

Parameter	Type	Description
LU	R	Name of the replica LU.
Replica	O	Name of the promoted replica. Default is the current replica name.

Example:

```
iscsicli replication promote lu=LU7 replica=NewLU7
```

rollback

Rollback a replica to the last successfully replicated image after a failed replication attempt.

Parameter	Type	Description
LU	R	Name of the replica LU.

Example:

```
iscsicli replication rollback lu=LU7
```

show

Show replication information of a LU.

Parameter	Type	Description
LU	R	Name of the LU.

Example:

```
iscsicli replication show lu=LU7
```

Backup Commands

Backup provides snapshots of groups or LUs for local raw device backup.

The operation class name is: **backup**

Under the backup operational class you can specify the following sub-operations:

enable

NOTE:

Enable backups for a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.
Pool or Disk	O	Pool or Disk to provide additional storage. Default: original disk or pool used to create the LU.
Percentage	R	Size to allocate for snapshot area given as a percentage of the size of the LU.
AutoExpand	O	Automatically expand snapshot area. Choices: Yes, No Default: No
ExpandBy	C	Size to auto expand given as a percentage of the size of the snapshot area.
MaxSize	C	Maximum size (in MB) for auto expand.
MinFree	O	Minimum free space (as a percentage of disk size) to trigger auto expand. Default: 10% of size
NotifyHost	O	Notify hosts when snapshots are created Choices: Yes, No Default: Yes

Example:

```
iscsicli backup enable lu=LU7 percentage=256 autoexpand=Y expandby=10
maxsize=512 minfree=20
```

NOTE: This will not create the snapshot area if snapshots have already been enabled under the **snapshot** or **replication** command.

disable

Disable backups for a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.

Example:

```
iscsicli backup disable lu=LU7
```

NOTE: The snapshot area is also used by the snapshot and replication options. If neither of those options are enabled, disabling snapshots will also free the snapshot area.

create

Create a new backup snapshot of a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.
Newname	O	Backup name. If left blank, the name defaults to Backup_of_*LU_Name*

Example:

```
iscsicli backup create lu=LU7 newname=backup1
```

remove

Remove a backup snapshot of a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.
Backup	R	Timestamp of the backup snapshot to remove. The format is YYYY/MM/DD HH:MM:SS. Use the show command to retrieve this.

Example:

```
iscsicli backup remove lu=LU7 backup="2004/08/19 12:00:00"
```

newsnap

Create a new snapshot of a group or LU for backup.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.

Example:

```
iscsicli backup newsnap lu=LU5
```

delsnap

Remove a snapshot of a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.
Snapshot	R	Name of the snapshot to remove. The format is YYYY/MM/DD HH:MM:SS..

Example:

```
iscsicli backup delsnap lu=LU7 snapshot=2004/08/19 12:00:00
```

mount

Mount a snapshot of a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.
Snapshot	R	Name of the snapshot to mount. The format is YYYY/MM/DD HH:MM:SS. Specify *last* to mount the last snapshot that was created.
NewName	O	Name of the new LU to mount. If not specified, the name will be: logical_unit_name@snapshot_name

Example:

```
iscsicli backup mount lu=LU7 snapshot=2004/08/19 12:00:00 newname=
LU7@1-AUG-2004.at.noon
```

Dismount

Dismount a snapshot of a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.
Snapshot	R	Name of the snapshot to dismount. The format is YYYY/MM/DD HH:MM:SS. Specify *last* to dismount the last snapshot that was created.

Example:

```
iscsicli backup dismount lu=LU7 snapshot=2004/08/19 12:00:00
```

list

List backups for a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.

Example:

```
iscsicli backup list lu=LU7
```

show

Show backup information and list backups for a LU.

Parameter	Type	Description
LU	R	Name of the LU.

Example:

```
iscsicli backup show lu=LU7
```

Restore Commands

Restore provides snapshots of groups or LUs for restore.

The operation class name is: **restore**

Under the restore operational class you can specify the following sub-operations:

mount

Mount a snapshot of a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.

Example:

```
iscsicli restore mount lu=LU7
```

Dismount

Dismount a snapshot of a group or LU.

Parameter	Type	Description
Group or LU	R	Name of the group or LU.

Example:

```
iscsicli restore dismount lu=LU7
```

Cluster Commands

Clustering allows a pair of iSCSI Feature Packs to provide the services of both servers in the event one fails.

The operation class name is: **cluster**

Under the cluster operational class you can specify the following sub-operations:

enable

Enable clustering of an iSCSI Feature Pack.

Parameter	Type	Description
Server	R	Name/IP address of cluster partner server.
User	R	NT account name on cluster partner server.
PW	R	Password for NT account name on cluster partner server.
Group	R	Cluster group.
VirtualIP	O	Cluster group virtual IP.

Example:

```
iscsicli cluster enable
```

disable

Disable clustering of an iSCSI Feature Pack.

Parameter	Type	Description
Server	R	Name/IP address of cluster partner server.
User	C	NT account name on cluster partner server. Required if server is specified.
PW	C	Password for NT account name on cluster partner server. Required if server is specified.

Example:

```
iscsicli cluster disable
```

suspend

Suspend clustering of an iSCSI Feature Pack.

Parameter	Type	Description
None	-	

Example:

```
iscsicli cluster suspend
```

resume

Resume clustering on an iSCSI Feature Pack.

Parameter	Type	Description
None	-	

Example:

```
iscsicli cluster resume
```

failover

Failover clustering to the iSCSI Feature Pack partner.

Parameter	Type	Description
None	-	

Example:

```
iscsicli cluster failover
```

failback

Failback clustering from the iSCSI Feature Pack partner.

Parameter	Type	Description
None	-	

Example:

```
iscsicli cluster failback
```

list

List cluster groups. Useful when for selection when enabling Cluster.

Parameter	Type	Description
None	-	

Example:

```
iscsicli cluster list
```

show

Show cluster information of the iSCSI Feature Pack.

Parameter	Type	Description
None	-	

Example:

```
iscsicli cluster show
```

Configuration Commands

Configuration provides maintenance of the configuration data of the iSCSI Feature Pack.

The operation class name is: **configuration**

Under the configuration class you can specify the following sub-operations:

backup

Backup the configuration data to a file.

Parameter	Type	Description
File	R	File to save the configuration data.

Example:

```
iscsicli configuration backup file=C:\MyBackups\iscsiserver.cfg
```

restore

Restore the configuration data from a file.

Parameter	Type	Description
File	R	File that contains the configuration data.

Example:

```
iscsicli configuration restore file=C:\MyBackups\iscsiserver.cfg
```

xray

Create an xray file for technical support.

Parameter	Type	Description
File	R	File to save the xray information.

Example:

```
iscsicli configuration xray file=C:\support\iscsixray.cab
```

iSNS Commands

The iSCSI Feature Pack includes the ability to operate with a local iSNS Server as well as other remote iSNS Servers.

The operation class name is: **isns**

Under the iSNS operational class you can specify the following sub-operations:

setmode

Change iSNS settings.

Parameter	Type	Description
iSNSMode	R	iSNS Mode Choices: Off, Local, Remote
IP	C	IP address of the remote iSNS Server.

Example:

```
iscsicli isns setmode isnsmode=off
iscsicli isns setmode isnsmode=local
iscsicli isns setmode isnsmode=remote ip=10.1.11.69
```

show

Display iSCSI initiators or iSCSI targets listed in the iSNS database, or iSNS settings.

Parameter	Type	Description
Detail	O	Information to display Choices: Settings, Initiators Default: Settings

Example:

```
iscsicli isns show detail=targets
```

iSCSI Commands

The operation class name is: **iscsi**

Under the iSCSI operational class you can specify the following sub-operations:

add

Add a license for a specified module that is installed on the iSCSI Feature Pack.

Parameter	Type	Description
License	R	License Keycode

Example:

```
iscsicli iscsi add license=12345678
```

remove

Remove a license for a specified module that is installed on the iSCSI Feature Pack.

Parameter	Type	Description
License	R	License Keycode

Example:

```
iscsicli iscsi remove license=12345678
```

reset

Reset the partner sever credentials. This is used to notify the local server of a credential change for one of its partners (i.e. cluster secondary).

Parameter	Type	Description
Server	R	Name or IP address of the remote server
User	R	User name used to connect to remote server
PW	R	Password used to connect to remote server

Example:

```
iscsicli iscsi reset server=cluster_server user=Administrator pw=
Password
```

show

Show the options installed on the iSCSI Feature Pack.

Parameter	Type	Description
Detail	O	Information to display Choices: Version, Options Default: Version

Example:

```
iscsicli iscsi show detail=options
```

addportal

Add an iSCSI portal to the default global template. The portals within the global portal template are assigned to a host when a host is created.

Parameter	Type	Description
Portal	R	iSCSI portal to add. The format is: ipaddress[:port[:group]]
Global	O	Add the portal to all hosts as well as the default global template. Choices: No, Yes Default: No

Example:

```
iscsicli iscsi addportal portal=10.1.11.72:3260:1 global=yes
```

removeportal

Remove an iSCSI portal from the default global template. The portals within the global portal template are assigned to a host when a host is created.

Parameter	Type	Description
Portal	R	iSCSI portal to remove. The format is: ipaddress[:port[:group]]
Global	O	Delete the portal from all hosts as well as the default global template. Choices: No, Yes Default: No

Example:

```
iscsicli iscsi removeportal portal=10.1.11.72:3260:1 global=no
```

removeallportals

Remove all iSCSI portals from the default global template.

Example:

```
iscsicli iscsi removeallportals
```

showportal

Lists all portals within the global portal template.

Example:

```
iscsicli iscsi showportal
```

Troubleshooting

Replace an iSCSI Feature Pack

1. Back up the current server configuration by selecting **Configuration** --> **Server Configuration Files** --> **Backup**.

   Save the configuration file to a secure place.

2. On the new server, set the same host name and the same IP address to support the Replication and Cluster options seamlessly.

3. Install the software on the new server.

4. Reboot the new server.

5. Restore the old server configuration on the new server in the same way you performed the configuration backup.

6. Refresh the screen until a message indicates a successful completion.

   The web service stops showing *Unable to connect to the server* message and the *Service Unavailable* screen appears.

7. Wait several minutes and connect again.

8. Complete the configuration by clicking **Configuration** --> **Server Credential**.

9. Enter authentication for each cluster partner.

10. If you are using any snapshot agents, type **ismon** in a command prompt on that machine to bring up the **Client Monitor interface**.

11. Remove the server and add it again.

Glossary

Host: File and application servers that access Logical Units.

Internet Storage Name Service (iSNS): Facilitates device discovery in storage networks. For the iSCSI Feature Pack, iSNS facilitates the naming, registration, and discovery of iSCSI Logical Units by host initiators. Your HP iSCSI Feature PackHP includes iSNS software that can be activated if Microsoft's iSNS software is not available.

iSCSI Initiator: Devices which request, or initiate, iSCSI data writes and reads. Each initiator can only be associated with a single host.

Logical Unit (LU): The basic unit of iSCSI storage, a LU is a logically mapped disk device that is created from a physical disk or from a storage pool.

Physical Disk: A single, physical hard disk.

Raw disk: A portion of a physical disk. The contents of a raw disk are not managed by the operating system and cannot be accessed by users (unlike with file systems).

Storage Pool: A group of one or more physical devices from a hardware RAID set (on systems with external storage).

Virtual Disk: A collection of one or more physical disks that are members of the same RAID set configured by a hardware RAID controller or the Windows operating system. A virtual disk is seen by the operating system as a single disk. When using hardware RAID, the RAID functioning is hidden from the operating system.